All-electronic cat-cracker control proves fast, reliable 80

Ethylene by steam pyrolysis gaining in U. S. 109

. . . also more than 200 terse reports on new processing techniques, chemicals, instruments, equipment . . . 6

DECEMBER 1959

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with PROCESS DYNAMICS

FROM BOTTLES TO BIGTIME CHEMICALS . . . AS NATIONAL DISTILLERS

approaches 10th place in chemical company profits

page 28

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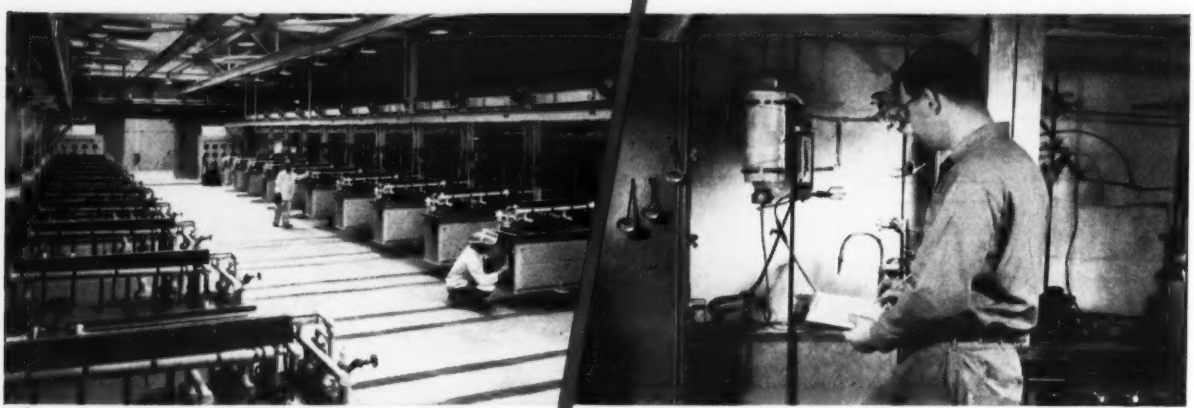

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Check 2264 opposite last page.

conventions and exhibits

November 30-*December* 4. 1959 Exposition of Chemical Industry, Coliseum, New York City.

December 6-10. American Institute of Chemical Engineers, Annual Meeting, Sheraton Palace Hotel, San Francisco.

December 7-9. Chemical Specialties Manufacturers Association, 46th Annual Meeting, Mayflower Hotel, Washington, D. C.

December 15. Material Handling Institute Annual Meeting, Savoy-Hilton Hotel, New York City.

December 28-29. ACS, Division of Industrial and Engineering Chemistry, Christmas Symposium, Baltimore, Maryland.

January 12-15. Society of Plastics Engineers, Inc., 16th ANTEC, Conrad Hilton Hotel, Chicago, Ill.

January 22. Engineers Joint Council, Annual Meeting, New York City, N. Y.

January 25-28. Plant Maintenance & Engineering Show, Convention Hall, Philadelphia, Pa.

February 1-4. American Society of Heating, Refrigerating and Air Conditioning Engineers, Semi-Annual Meeting, Dallas, Texas.

February 1-5. Instrument Society of America, Instrument and Automation Conference & Exhibit, Sam Houston Coliseum, Houston, Texas.

February 2-4. Fifteenth Society of the Plastics Industry, Reinforced Plastics Division Conference, Edgewater Beach Hotel, Chicago, Illinois.

February 14-18. American Institute of Mining, Metallurgical, and Petroleum Engineers Annual Meeting, New York City, New York.

March 14-18. National Association of Corrosion Engineers, National Meeting, Dallas, Texas.

THAT'S INTERESTING

Alcoholism control

A 130-page book has evolved from Du Pont's success in rehabilitating alcoholics among its 85,000 employees. The book is designed as a guide to control alcoholism by individuals and organizations. In Du Pont's program, 1254 cases of alcoholism were uncovered. Of this total, 690 were rehabilitated and 240 were improved. The book points out that unless an alcoholic is rehabilitated, he can lose his health, his sanity or his life.

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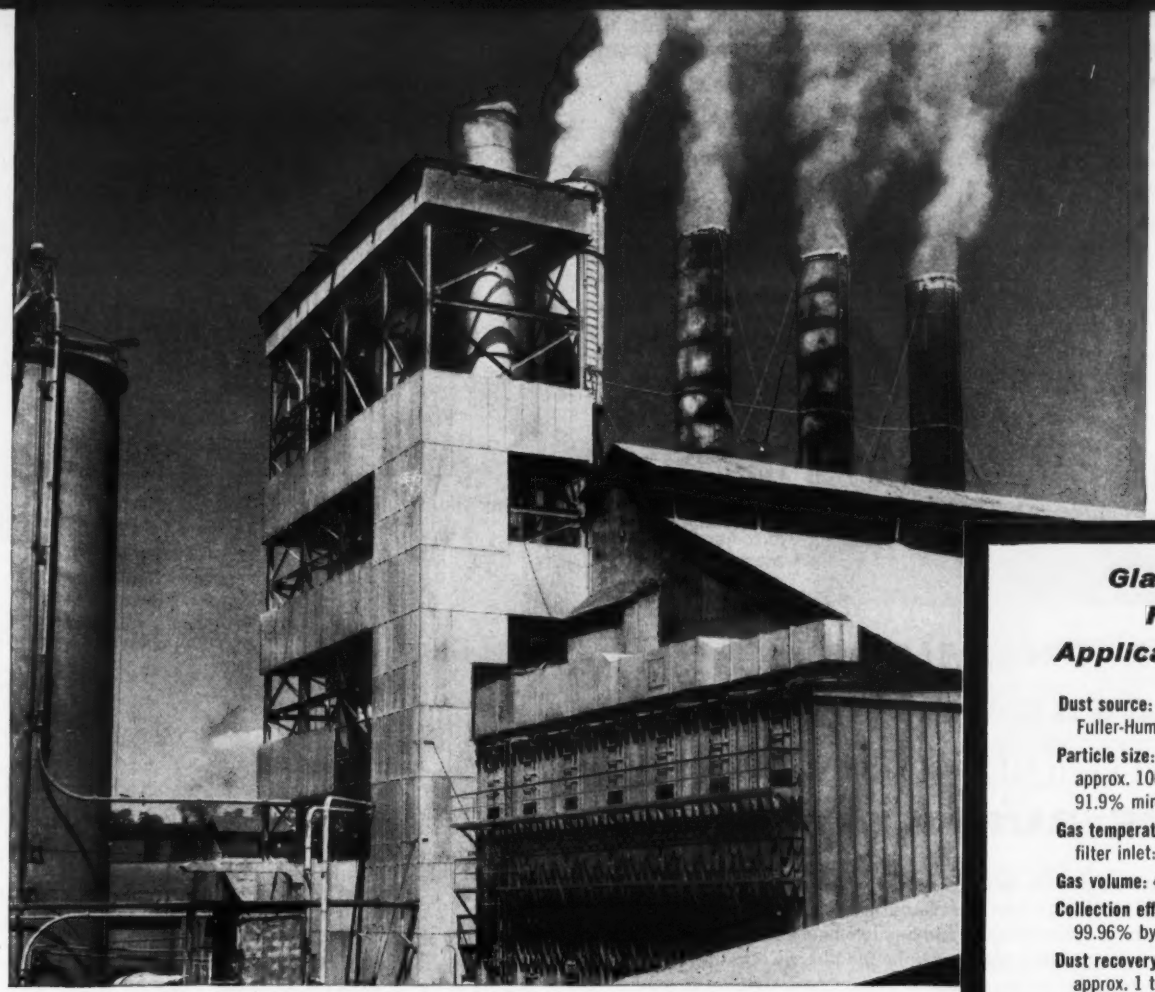

Dracco Glass-Bag Filter stops air pollution

Glass-Bag Filter Application Data:

Dust source: cement kiln with Fuller-Humbolt preheater

Particle size: approx. 100% minus 10 microns 91.9% minus 5 microns

Gas temperature: filter inlet: 570-600° F.

Gas volume: 42,000 cfm

Collection efficiency: 99.96% by weight

Dust recovery rate: approx. 1 ton/hour

Filter size: 7 compartments, 48 fiber glass bags per compartment

Bag cleaning method: SONOCLEAN

The unretouched photograph shows the kiln stacks at an eastern cement plant. *All five kilns are operating!* One stack is clean because a Dracco Glass-Bag Filter is removing all visible dust from the hot kiln exhaust gas.

Results like this have made Dracco Glass-Bag Filters industry's most effective weapon against air pollution.

New performance standard

Previously the hot kiln gases would have made this an "impossible" job for a cloth bag collector. But fiber glass cloth filters, pioneered by Dracco, can collect hot, corrosive dust and fumes to 600° F. at virtually 100% efficiency.

This radically better dust collector is now available to solve the toughest air pollution problems: cement kilns, calciners, metallurgical furnaces, power boilers, chemical processes, cupolas, steam micronizers, carbon black production.

Exclusive advanced design

Dracco Glass-Bag Filters are engineered systems of modular design which operate automatically and incorporate exclusive means of cleaning filter bags. The patented SONOCLEAN unit utilizes sonics to remove all dust without cloth wear or fracture. Alternately, for light flocculent dust, the patented SWING-CLEAN mechanism uses gentle motion to dislodge difficult dusts. Both SONOCLEAN and SWING-CLEAN assure long bag life which in some cases has exceeded two years.

For further information on Glass-Bag Filters, today's most advanced equipment for air pollution or hot dust problems, contact: Dracco Division of Fuller Co., Harvard Ave. and East 116th Street, Cleveland 5, Ohio.

DRACCO *airstream* conveyors
dust control equipment

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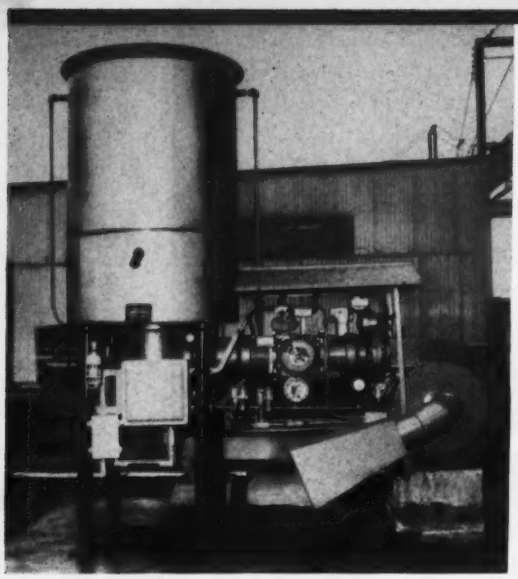

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Acetylene, methane & hydrogen mixture	Ethyl ether
Carbon disulfide vapors	Dimethylformamide & formic acid
	Benzene

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CHEMICAL PROCESSING PREVIEW
and CHEMICAL BUSINESS

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Vol. 22 December 1959 No. 12

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What's Our Purpose?

Why are you, a graduate chemical engineer, in the publishing business? This is a question that has often been tossed at me during visits to chemical plants.

My answer is simple. As a technical editor, I feel that I am contributing the most to industry, my country, and profession. Accurate dissemination of scientific information is more important today than ever before. Both our national welfare and defense depend upon it. The Soviet threat is real. We must stay in front if our democracy is to survive.

Technical editors and their publications can contribute a great deal in this respect. They are key instruments in making advance technological knowledge and its application to industrial processes available to the field . . . so that maximum use can be made of it.

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Scientific information services have gained national recognition. Our publication is no exception.

In this increasingly scientific age, it is imperative that all persons engaged in the dissemination of technical information have sound technical backgrounds. We believe that our staff of engineer-editors has what it takes to make you want to read CHEMICAL PROCESSING. Their combination of training **plus** experience adds up to one thing: More profitable reading for you!

Ted F. Reinhardt

Associate Editor

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highlights

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CHEMICAL PROCESSING

DECEMBER 1959

VOLUME 22 • NUMBER 12

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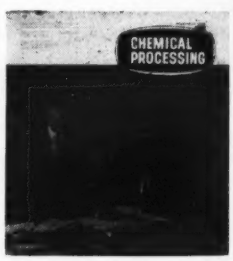

In the past decade National Distiller's division. U.S. Industrial Chemicals Co., has been guided to bigtime chemical company status through the imagination and drive of the USI Executive Committee shown on our cover. Members are (l-r) Roy Coppedge, president (legal counsel); "Jack" Bierworth, board chairman (financier with contacts); Bill Marsh, vice-president (administrator); and Bob Hulse, executive vice-president (technologist in management). For details of this amazing growth turn to CB Profile beginning on page 28.

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SPECIAL READER SERVICES

• For more information on articles and advertisements in this issue, check the Reader Service slip opposite last page

• To subscribe to this magazine see reader-qualification form opposite last page

PROCESS DYNAMICS

In the November issue, CHEMICAL PROCESSING added to its name the two words, **Process Dynamics** . . . more clearly defining today's expanding concepts in the chemical processing industries.

Process Dynamics entails consideration of a chemical process as continuously being in an unsteady state. The performance of each component making up the process is subject to disturbances which must be compensated for, to keep the overall performance within practical limits of divergence.

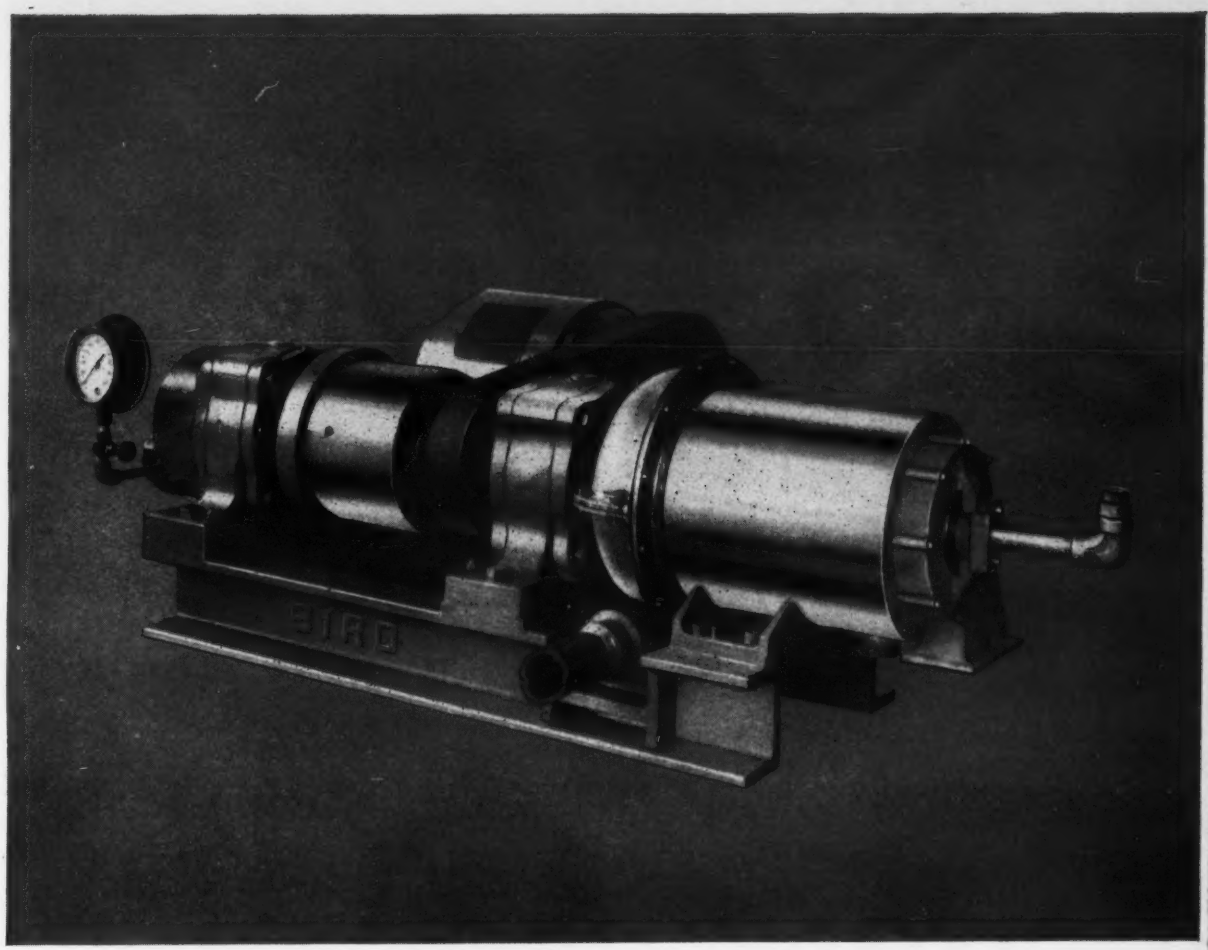
More than 20 years ago, CHEMICAL PROCESSING editorially pioneered presentation of articles reporting the **performance** of chemical processing equipment and materials, under actual operating conditions. These performance reports were then named "New Solutions of Processing Problems." They were given major emphasis in the magazine's editorial columns.

So, CHEMICAL PROCESSING moves naturally into coverage of what's happening in the field of process dynamics . . . and a lot **is** happening today. Process dynamics is a logical next step beyond "New Solutions."

We on the editorial staff of CHEMICAL PROCESSING view the field and science of process dynamics with excitement. Because many facets of the field have not "gelled", this makes the subject all the more interesting. For one thing, there is no general agreement on accepted practices throughout industry.

With the cooperation of the field and our many friends, we shall bring you vital information on these new concepts as they grow and mature.

JOHN B. MELLECKER
Editor East



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* But do not underestimate the capacity of this small Bird. Considering its size it has the appetite of an ostrich.

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THE BIRD CONTINUOUS SOLID BOWL CENTRIFUGAL

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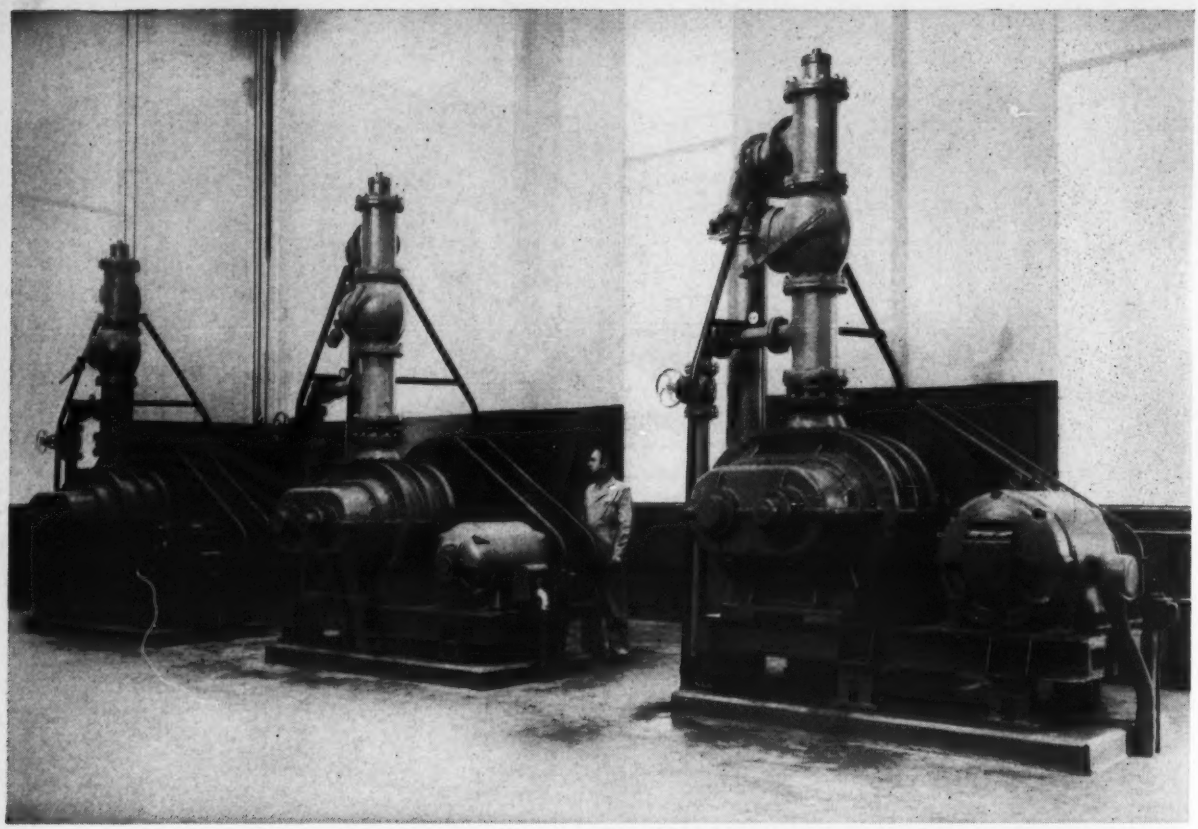

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1164
8-11

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letters from readers

More information given on mass flowmeter

Dear Mr. Vaaler:

Thanks for the story on our new industrial true mass flowmeter run in your September issue (page 106). We read it with interest.

For the edification of those of your readers interested in receiving further information, however, I'd like to bring a correction to your attention. The flowmeter was actually a joint development of General Electric and Black, Sivalls, & Bryson, Inc.

Under current joint marketing agreements, Black, Sivalls, & Bryson, Inc. will market the product to the natural gas industry, while General Electric will handle this responsibility in all other fields.

MARK HOPKINS JR.
Industrial Products Press Relations
General Electric Company
Schenectady 5, N.Y.

Reader rips into plan to blunt red dumping

Dear Sir:

In your October "Letters from Readers" column (page 12), a reader suggests that American manufacturers could "blunt" the dumping of Russian commodities in the American market by buying up and re-selling such commodities, thereby making up for the lost sales of their own products.

This suggestion (by a reader who describes himself as a development chemist) could only have been prompted by an abysmal lack of understanding of the economics of the ideological world war now raging, or else it is a deliberate infiltration of your very worthy publication by a deadly propaganda virus of the common enemy of freedom.

What about American workers idled by curtailment of American commodities replaced by imports? And what would happen to the importing American companies' ability to produce, whenever the Russians decided to cut off, or

threaten to cut off, their supplies to us?

The Communist world trade strategy is simply to weaken and make the economies of its intended victims dependent upon the Soviet bloc.

What is the American answer? Is it not the "guts" of the leadership of American industry and commerce to resist to the death all temptations to be diverted from producing, buying and using American raw materials to make American goods for sale at a fair price?

Is it not the "guts" of the American worker to give a full day's work for a fair day's pay, and to refrain from pricing American goods out of the world market, and himself out of a job, by continuing to demand higher and higher wages for the same effort expended?

This answer is the only one in which the free industrialist and the free worker can together take voluntary responsibility (at whatever cost to personal pride and personal gain) for the integrity and perpetuation of a free economy, and hence a free nation.

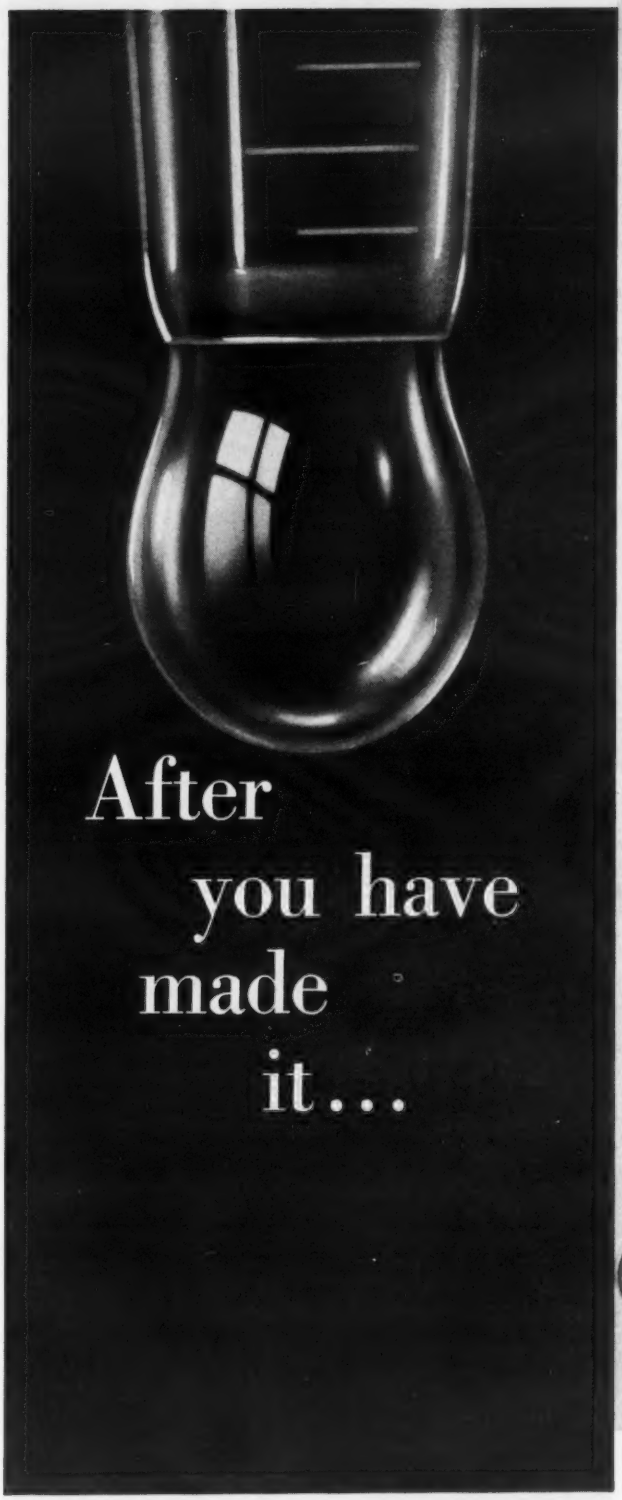
CECIL M. COOPER
Mechanical Engineer
Standard Oil Company of California
El Segundo, Calif.

Hopes to leave world better place to live in

Dear Editor:

The work of dedicated scientists and engineers is indeed inspiring. Your journal is doing a magnificent thing in publishing the findings of these individuals who give of themselves in the beautiful — nay, sacred — search for truth and scientific accuracy. I, too, want to leave the world a better place in which to live.

I read recent communications (concerning the Variable Constant System and variations thereon), and there welled up within me something bigger than I am. I suddenly saw with stark clarity the quantitive evaluation of one of the scientific world's



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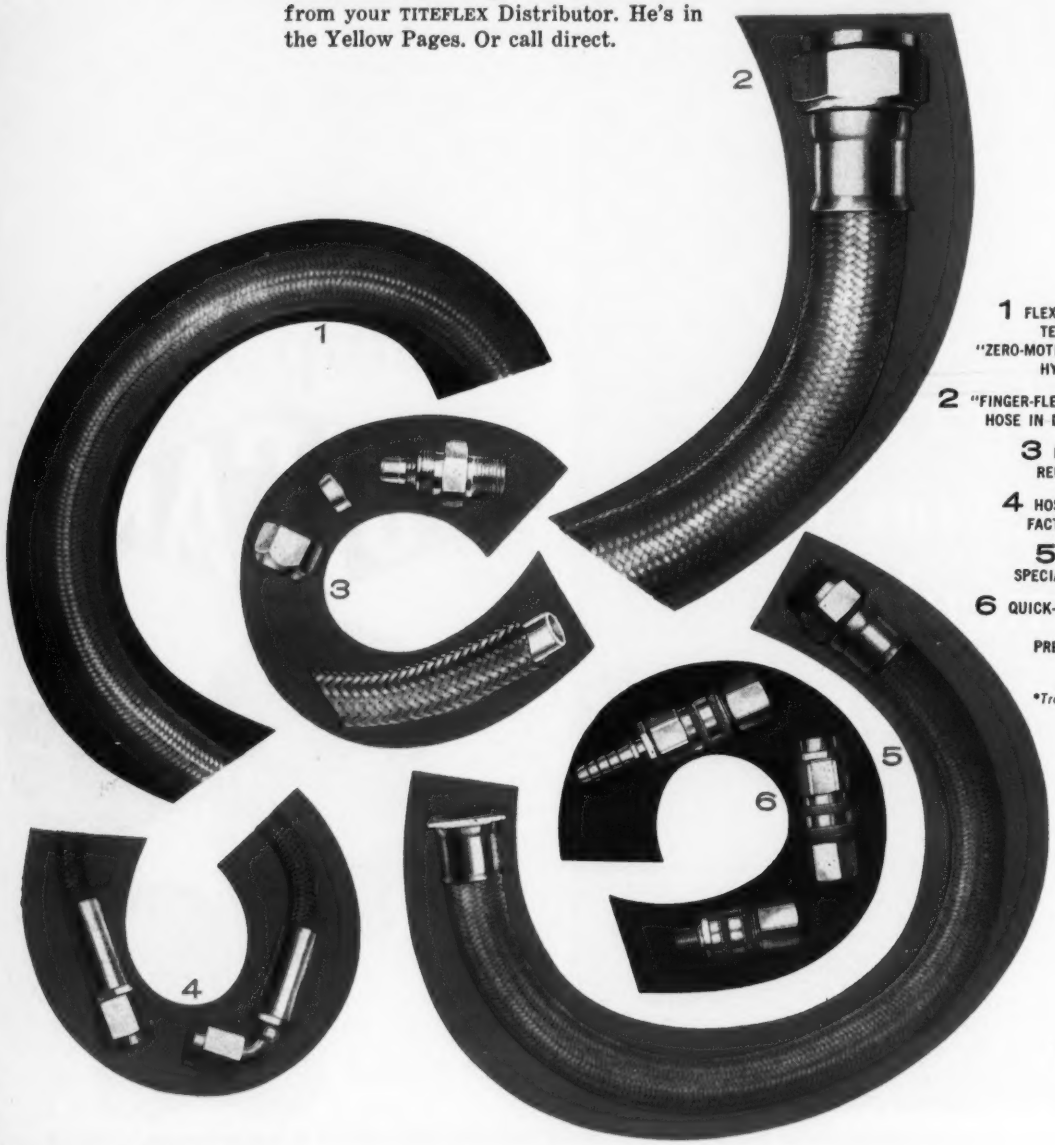

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Check 2271 opposite last page.

most elusive concepts — The Confusion Coefficient.

In C.G.S. units, this fundamental constant may be defined as follows:

One casey = the confusion experienced by Casey at 4:30 Friday afternoon, at a national technical meeting, listening to an unintelligible drone and viewing illegible slides, reduced to sea level.

Of course, this unit is too large for practical engineering applications so we have the micro casey:

$1\mu C = 1 \text{ casey} \times 10^{-6}$

Below are some rough preliminary measurements:

- 0-10μc Normal background confusion.
- 15-35 " Forgets to mail wife's letter.
- 40-60 " Forgets friend's name when introducing him to stranger.
- 75-85 " Trumps partner's ace.
- 90-100" Forgets anniversaries.
- 1000 " Confinement and physical restraint advisable.

The c value varies considerably from day to day and week to week because of variables not yet completely evaluated. However, from theoretical thermo-psychotic considerations, it seems reasonable to postulate that, during consideration of any one problem, c varies with time exponentially:

$$c_2 = c_1 k$$

Thus, individuals may be classified according to their k values:

- $k = 1$ average
- $k < 1$ genius
- $k > 1$ dope

Before publication in The International Critical Tables, I hope my colleagues will verify these findings on the magneto-electronic thought-wave activated-atom nutmeg-grating confusometer which I hope the Bureau of Standards will develop. It is also hoped that eventually the bureau can furnish qualified laboratories with primary standards. In the meantime, perhaps, they could calibrate various individuals who could be shipped out and used for direct comparison.

ROBERT S. CASEY
Research Laboratory
W. A. Sheaffer Pen Co.
Fort Madison, Iowa

Watching Washington

Up-to-date Schedule of Tariffs Ready for Congress' Scrutiny

Chemical companies with a stake in foreign trade can look for a modernized schedule of tariffs next year if Congress goes along with U. S. Tariff Commission recommendations.

Tariff schedules are lists of duties which must be paid on various imports. The revised classification system will be up to date, clearer and easier to use than the current one, the commission says.

In 1954, Congress passed the Customs Simplification Act. One section of it directed the commission to study tariff classification laws and revise and consolidate them to accomplish three objectives:

1) Establish tariff schedules which are logical in arrangement and terminology and adapted to the changes which have occurred since 1930 in the character and importance of articles produced in and imported into the United States and in the markets in which they are sold;

2) Eliminate anomalies and illogical results in the classification of articles;

3) Simplify the determination and application of tariff classifications.

Commodity regrouping was to be accomplished with no changes in duty "except as incidental."

The sweeping revisions represent the first major change in U. S. tariff law since 1930. Although there have been amendments to the act in the ensuing 29 years, schedules of duties have not kept pace, for example, with the many new chemicals developed in the last two decades.

Called "Giant Task"

Speaking at a seminar of the Synthetic Organic Chemical Manufacturers Association, Paul Kaplowitz, the commission's general counsel, described the "giant task" involved. He said the new chemicals schedule reflects the over-all general innovations.

Provisions of general application scattered throughout the statutes are now consolidated in a set of "General Headnotes and Rules of Interpretation." The appendix will include such factors as temporary tariff legislation and escape clause proclamations.

The new schedules contain almost 5000 rate descriptions compared to 3250 now effective. It is expected the new schedules, if adopted, will facilitate development of more accurate import statistics. Reporting of import data usually follows the form of the tariff schedules, and at present descriptions are often not specific.

Kaplowitz praised the "able and timely assistance" of SOCMA and other chemical industry groups in organizing the revised schedule — one of the best examples of industry cooperation the commission received, he said.

The commission expects to send the revised schedules to Capitol Hill during the next session with the hope they will become law. While no one's saying, Congressional consideration of this particular matter could spark a gigantic log-rolling move in the entire area of tariffs.

FDA proposal seen as heptachlor ban

Of concern to manufacturers of pesticide chemicals is a Food and Drug Administration proposal which would, in effect, ban the use of heptachlor on certain food crops.

Currently, residues of one-tenth of one part per million are permitted on harvested fruit, vegetable, grain and

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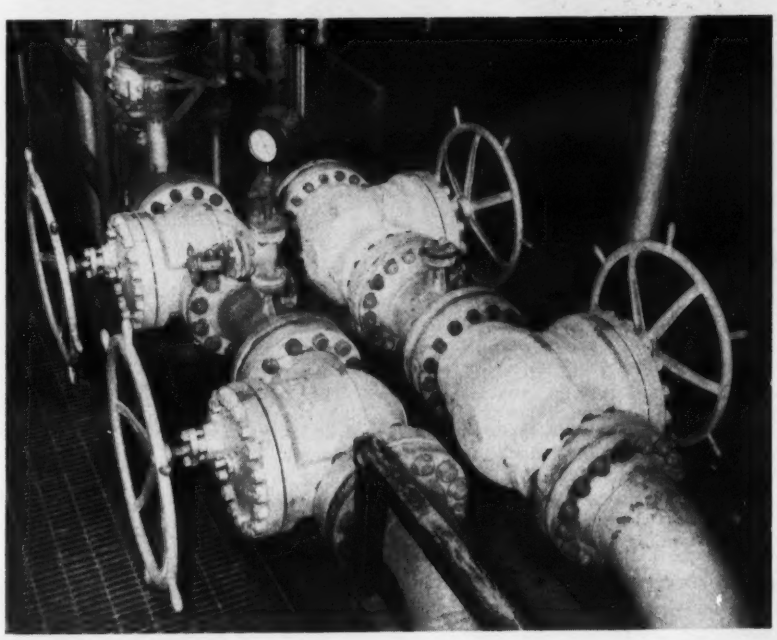
Above sizes except 10" available in Screwed Ends.
*End to End Dimensions are Special.

ORBIT CAST STEEL VALVES INSTALLED ON HYDROGEN GAS COMPRESSOR MANIFOLDS IN A LARGE OHIO REFINERY.



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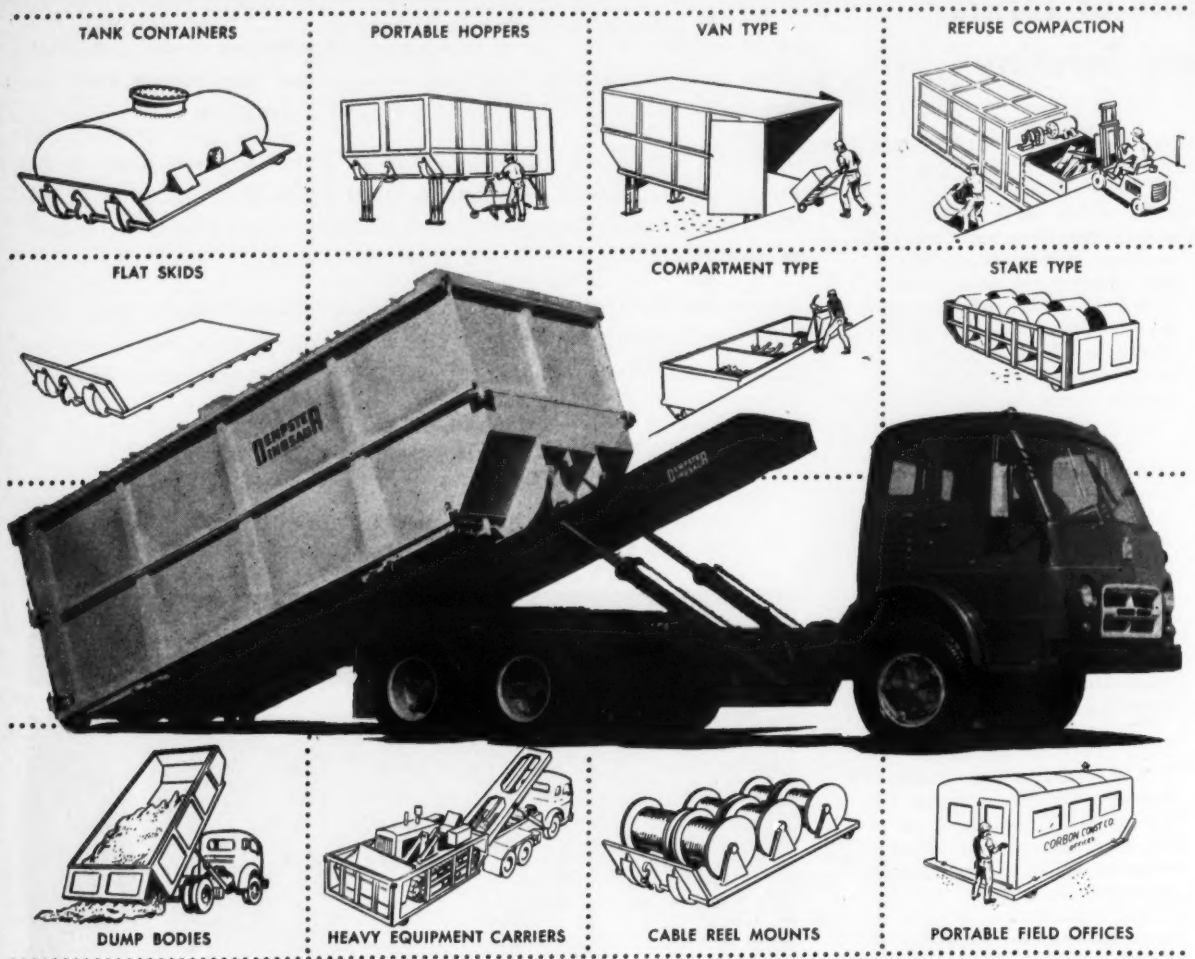
Check 2272 opposite last page.

One DINOSAUR With Detachable Containers Solves Many Complex Materials Handling Problems



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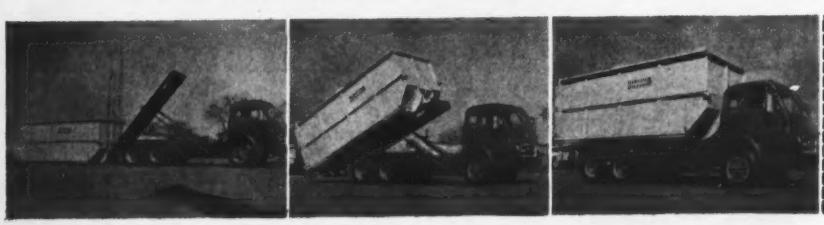

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Check 2273 opposite last page.

forage crops. FDA has proposed a zero tolerance for residues of the widely used pesticide.

The proposal has been made as a result of new scientific data which shows that an oxidation product of heptachlor — heptachlor epoxide — forms on crops, largely from weathering. Residues of the epoxide on crops have gone undetected in the past because the analytical method for detecting the product differs from that used to find heptachlor.

Recent FDA studies show these residues are likely to be present on crops even though farmers follow official recommendations for applying the pesticide.

Epoxide residues also are deposited in meat and milk when forage containing the residue is fed to meat and dairy animals.

FDA says available animal test data reveals the epoxide appears to be more acutely toxic than heptachlor. Still to be completed is long-term testing and evaluation of results to prove the safety of combined residues of heptachlor and its epoxide.

Process-heat reactors win favor of industry

Preliminary results of a questionnaire to obtain industry views on process-heat reactors have been released by the Atomic Energy Commission. Industry representatives attending a recent AEC-sponsored symposium favored further development of process-heat reactors which would produce steam at up to 600 psi at a rate of 100,000 to 250,000 lb/hour.

According to some of the answers, a nuclear reactor would be used for normal steam production, and conventional steam plants would be used for standby purposes or to meet peak loads.

Preference was expressed for developing such reactors on a cooperative basis between the commission and industry.

The commission would provide necessary research and

development assistance, with industry contributing to construction costs. Most answers held that the government should take the lead in developing economic nuclear process heat. Estimate of the time necessary for such development without federal leadership was 10 to 20 years.

Fluorspar industry to be studied

In other action, the U. S. Tariff Commission, following a Senate resolution, will investigate the fluorspar industry at public hearings beginning December 15. (June "Watching Washington," page 12.)

The commission must submit to Congress before February 29 data on the industry's current condition. This includes recommendations as to what additional import restrictions, if any — by way of increased duties or import quotas, or both — need to be imposed in order that fluorspar mining operations "may be conducted on a sound and stable basis."

The commission also is to look into the matter of whether action should be taken to correct the disparity in existing rates of duty.

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GOULDS PUMPS

Check 2274 opposite last page.

Spotlight On People

An executive committee of the board of directors has been appointed at Mallinckrodt Chemical Works. DR. JOHN R. RUHOFF is chairman. Other members are EDWARD MALLINCKRODT JR., JOSEPH FISTERE, JOHN E. GASTON, AUGHST H. HOMEYER and HAROLD E. THAYER. The company also announces appointment of Mr. Thayer as executive vice president, a newly created post.

Celanese Chemical Company announces appointment of four new executives. They are HENRY K. DICE, vice president-technical director; DAVID D. HECHT, vice president-product development; ROBERT H. KAMPSCHULTE, vice president-sales; ERNEST T. LINDSEY, vice president-manufacturing.

WILLIAM B. HALL is named president of the newly formed Vitro Chemical Company. He will continue to serve as vice president of Vitro Corporation of America.

At Nalco Chemical Company, DR. DAVID G. BRAITHWAITE is named to the new post of executive vice president in charge of manufacturing, research and development.

JOSEPH G. SOLARI is named vice president in charge of sales for Great Lakes Carbon Corporation's Carbon Div.

MERWIN BRISTOL is elected a director and general counsel of Standard Oil Company (Indiana).

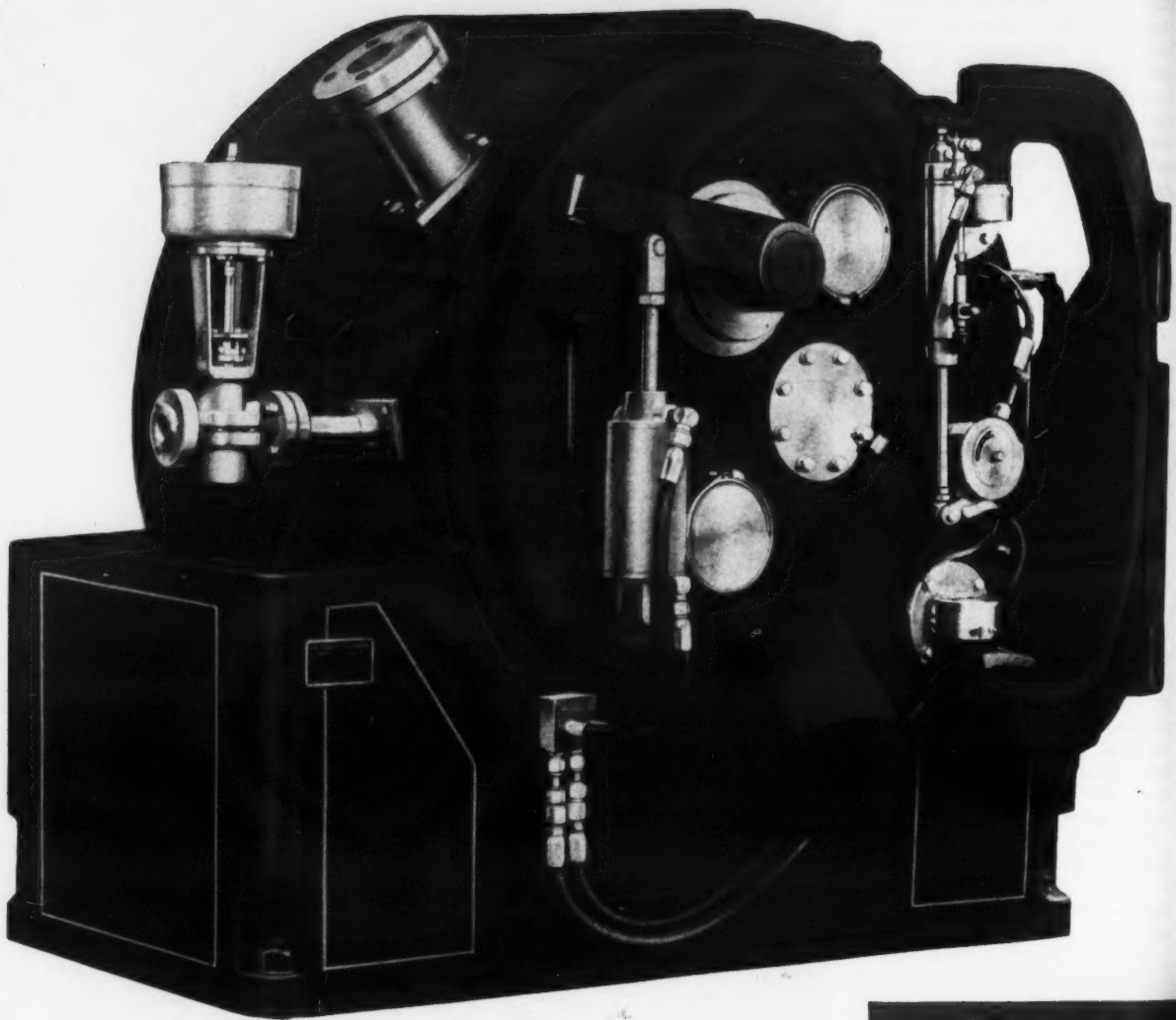
At The Dow Chemical Company, DONALD K. BALIMAN and C. B. BRANCH are elected vice presidents. In other board action, ROBERT B. BENNETT is elected company treasurer and FRED H. BROWN is named to the newly created post of company controller.

New directors of Puritan Chemical Company are RAYMOND C. HAGEL and R. CARL CHANDLER.

Linde Company, division of Union Carbide Corporation, announces appointment of SIDNEY WADE as vice president-distributor products.

M. E. LEWIS is named a vice president of Armour and Company. He is general man-

years - ahead



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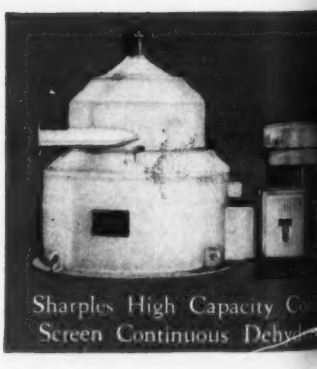

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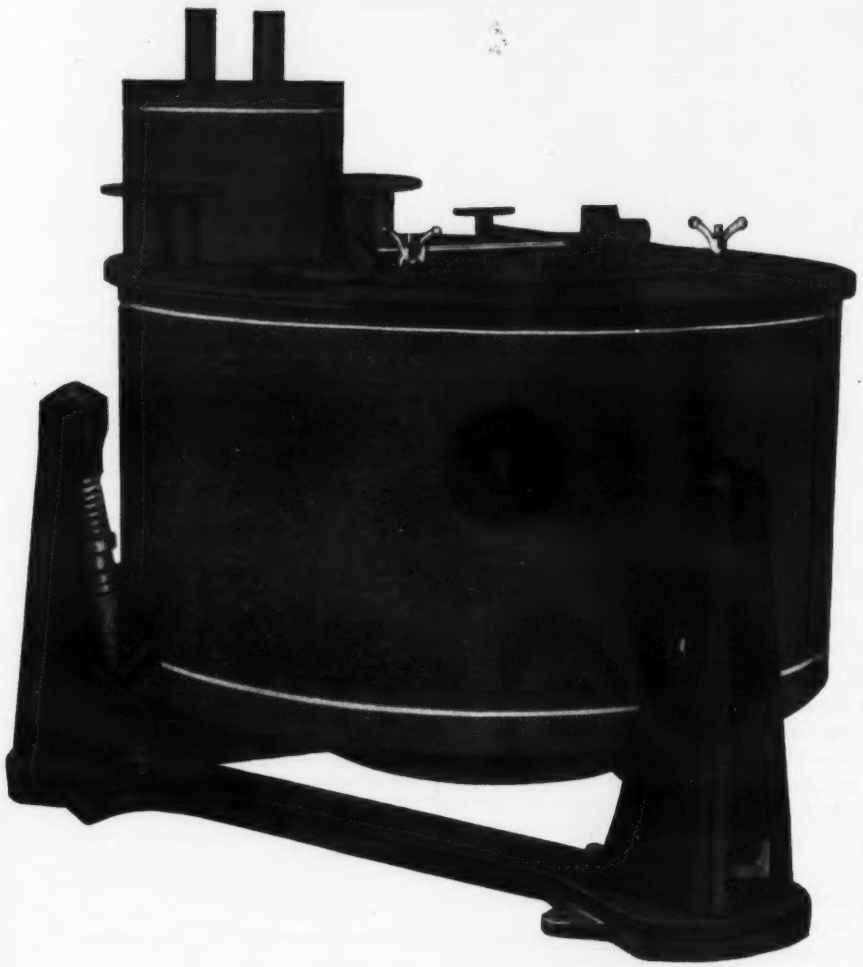
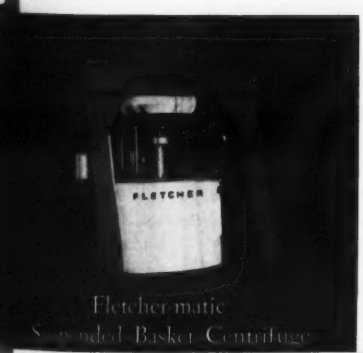


Fletcher "Tornado" Automatic
Vertical Basket Centrifuge



Fletcher matic
Suspended Basket Centrifuge

BOOTH 459

FLETCHER
CENTRIFUGES a division of The SHARPLES CORPORATION

Check 2275 opposite last page.

ager of Armour Industrial Chemical Company.

JOHN S. SPROWLS is named vice president and assistant to the president of The Vickers Petroleum Co., Inc.

At Michigan Chemical Company, GEORGE L. INNES is appointed director of sales and development. He had been manager of the Chemical Sales and Development Division of Climax-Molybdenum Company.

The newly created post of director of foreign development at Minnesota Mining and Manufacturing Co. has been filled by ROBERT D. SCARLETT.

JOHN O. LOGAN is named associate general manager of the Chemicals Division, Olin Mathieson Chemical Corporation. A corporate vice president, he had been general manager of industrial chemicals.

At Archer-Daniels-Midland Company, J. C. BURKHOLDER is appointed manager of the Resin Division.

Dewey and Almy Chemical Division of W. R. Grace & Co. announces appointment of CHARLES E. BROOKES as manager of marketing of the Organic Chemicals Division.

ELLIS D. VERINK JR. is named manager of chemical and petroleum industry aluminum sales for Aluminum Company of America.

International Salt Company announces that PAUL S. TRIBLE has been appointed to the newly created post of general sales manager.

Two major sales appointments are announced by Kaiser Refractories and Chemicals Division of Kaiser Aluminum and Chemical Corporation. RUSSELL T. DRENNAN, formerly general sales manager for Kaiser Chemicals, is appointed the division's director of sales. EUGENE C. TINSLEY, formerly a director and vice president of Mexico Refractories Company, becomes division director of marketing.

R. A. WILSON is the new president of Magnaflux Corporation, whose business and assets were acquired recently by General Mills, Inc. Wilson,

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VIEW ABOVE SHOWS MOLDED PACKING

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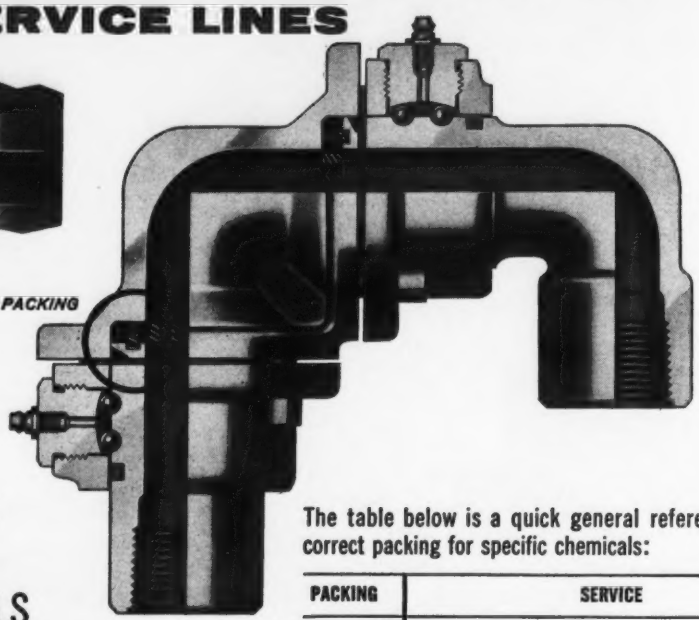

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The table below is a quick general reference for the correct packing for specific chemicals:

PACKING	SERVICE
Neoprene	Recommended for alkaline and acid salt solutions and aldehydes such as formaldehyde.
Hycar	These should be used for petroleum derivatives, neutral or slightly acidic salt solutions, dilute acids (Sulfuric to 50%, Hydrochloric and Nitric to 20%), alcohols, glycols, ethers, gases (Oxygen not over 500 psi), and vegetable oils.
Butyl	Recommended for liquid or anhydrous ammonia, gases (except oxygen over 500 psi), ammonia derivatives such as hydrazine and for certain hydraulic fluids such as Pydraul, Skydrol, and Cellulube. It is recommended for acetone and methyl ethyl ketone.
Teflon*	Used for concentrated or fuming acids and other highly oxidizing fluids, esters, aromatics, liquid chlorine, bromine and fluorine if temperature is not excessive.
Asbestos	For use in saturated steam service.
Viton "A"*	Recommended for use with concentrated acids, aromatics, liquid chlorine, liquid bromine, chlorine or bromine derivatives, molten sulfur, and carbon disulfide.
Metallic	For extreme services such as hot gas at 600°F., a Stainless Steel metal disc, specially treated to prevent galling, is recommended.

* R.T.M. DU PONT

The DS Series swivel joint with its broad service range can be a valuable new tool in your process system. Use it in chemical loading of tank car or tank truck, for stress relief in piping subjected to vibration, expansion or settling, or as a steam rotation connection between stationary and revolving equipment. Wherever you use it, you'll find it pays for itself in extended service life.

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PEOPLE

General Mills vice president and general manager of its Mechanical Division, succeeds F. B. DOANE, who retired as Magnaflux president and board chairman but who will continue to serve as a consultant.

E. E. SMITH is appointed manager of the Chemical Division of Climax-Molybdenum company. He will direct all chemical sales and development activities for Climax.

Victor Chemical Works 'invades' teen market

A Chicago-based chemical company is going in for teenagers.

Victor Chemical Works has not thrown open its employment rolls to the high school crowd but is invading a market of 9.5 million potential customers.

It is doing it by an intensive campaign in behalf of the nation's milling industry to help educate and stimulate interest among teen-age girls in the use of self-rising flour and self-rising corn meal.

Beginning next month, Victor again is sponsoring a recipe contest. Students and teachers will share in the prizes. Home economics teachers will be invited to conduct classroom and laboratory sessions on the two ingredients for white bread and corn bread.

Teenagers will be asked to bring to class their best home-prepared recipes. A panel or their teacher will judge entries. Winners' recipes will be entered in Victor's national recipe contest. Seventy prizes, ranging up to $1000 scholarships or U. S. Savings Bonds, will be offered.

To launch the program, Victor invited millers in four sections of the country to a "Big Top" kick-off presentation.

Theme of the meetings was "C'mon, Get Into the Act." Central character was "Miss Teena Market," who appeared before audiences in Cinemascope color and stereophonic sound on a screen placed in a set which simulated a circus tent.

Union Carbide Set to Convert Texas Site to Chemical Plant

Union Carbide Corporation and some of its divisions are busy on a variety of fronts with expansion and construction programs.

One of the most important is conversion of recently purchased facilities at Brownsville, Texas, to a chemical plant. The parent company has completed engineering and economic studies preparatory to beginning construction next April to turn facilities formerly owned by Amoco Chemicals Corporation into a plant for producing solvents and intermediates.

Work is scheduled to be completed in March 1961. Property on which the buildings are located is being leased on a long-term basis from the Brownsville Navigation District.

Also in Texas, Union Carbide is expanding polyethylene production facilities at the Seadrift and Texas City plants. When projects are completed in 1961, they will add 170 million lb a year to the company's output of high-pressure polyethylene.

At Marietta, Ohio, the company is to build a plant to produce 25 million lb a year of bisphenol-A. Facilities will be operated by a division, Union Carbide Plastics Company. Startup target date is early 1961.

Oxygen-Nitrogen Plant

Linde Company, a division, expects to have in operation late next year a plant to produce 135 tons a day of liquid oxygen and nitrogen. It is being built primarily to supply cryogenic fluids to the missile-engine production facilities at Fort Crowder Reservation, Neosho, Mo.

Remodeling work is under way at Union Carbide Metals Company's plant at Sheffield, Ala., to permit production of calcium carbide. An existing submerged-arc electric smelting furnace formerly used for ferroalloy production is being converted. Production of CaC_2 is due to begin by mid-1960.

Construction is expected to be completed by year's end on a polyethylene film plant being built by Visking Company, division of Union Carbide Canada Limited, at Cowansville, Quebec. It is expected the facilities will be in production by next April.

Crown Zellerbach Corporation is building a chemical complex at its Bogalusa, La., pulp and paper mill site to manufacture industrial chemicals derived from the kraft pulping process.

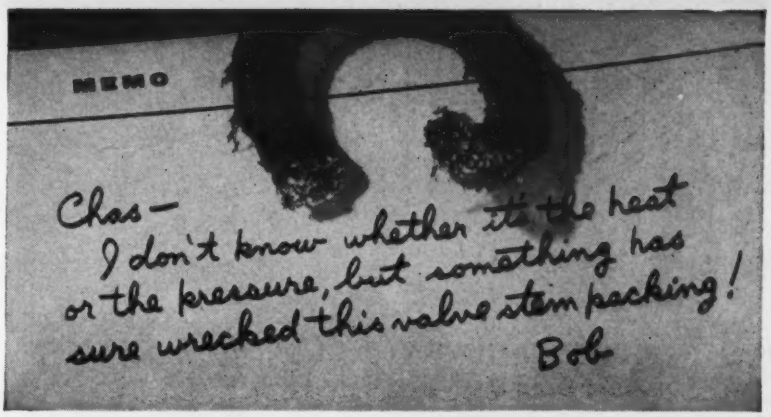
A dimethyl sulfoxide plant with an annual capacity of five million lb is scheduled to begin operations early next year. Soon after its startup, a dimethyl sulfide facility is scheduled to go into operation. It will have a capacity of 10 million lb annually, and will also turn out approximately one million lb of methyl mercaptan.

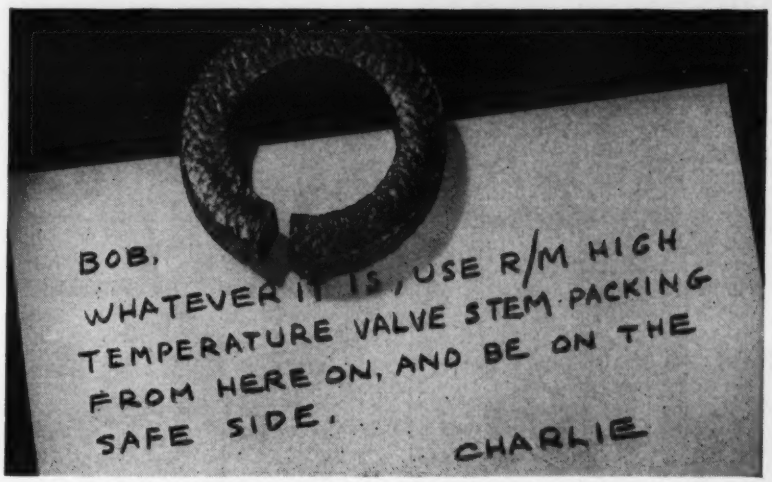
Texas Eastman Company, a manufacturing division of Eastman Kodak Company, is now producing polypropylene plastic on a limited commercial basis at its Longview, Texas, plant.

U. S. Industrial Chemicals Co., division of National Distillers and Chemical Corporation, once again is expanding capacity of its Houston plant to produce polyethylene resins. The increase of 50 million lb a year will raise annual capacity to 200 million lb there.

Du Pont is increasing by 40 percent the capacity of its plant at Belle, W. Va., to make methyl methacrylate.

Phillips Chemical Company, subsidiary of Phillips Petroleum Company, is further expanding ethylene capacity of its Sweeny, Texas, plant by





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Check 2277 opposite last page.

35 million lb a year. By the second quarter of 1960, the plant's annual capacity will reach 290 million lb.

Sohio Chemical Company expects to make initial product test runs early next year at its new acrylonitrile plant at Lima, Ohio.

American Metal Climax, Inc. expects to have in operation next year a new germanium refining plant at Carteret, N.J. Germanium dioxide will be made from both primary materials and scrap.

Hercules Powder Company has started a multi-million-dollar expansion of its dimethyl terephthalate plant at Burlington, N.J., which will more than triple capacity. Next October is target date for completing the work.

Montrose Chemical Company has in operation a multi-million-lb dimethyl isophthalate plant in Newark, N.J. The material is being made through esterification of isophthalic acid.

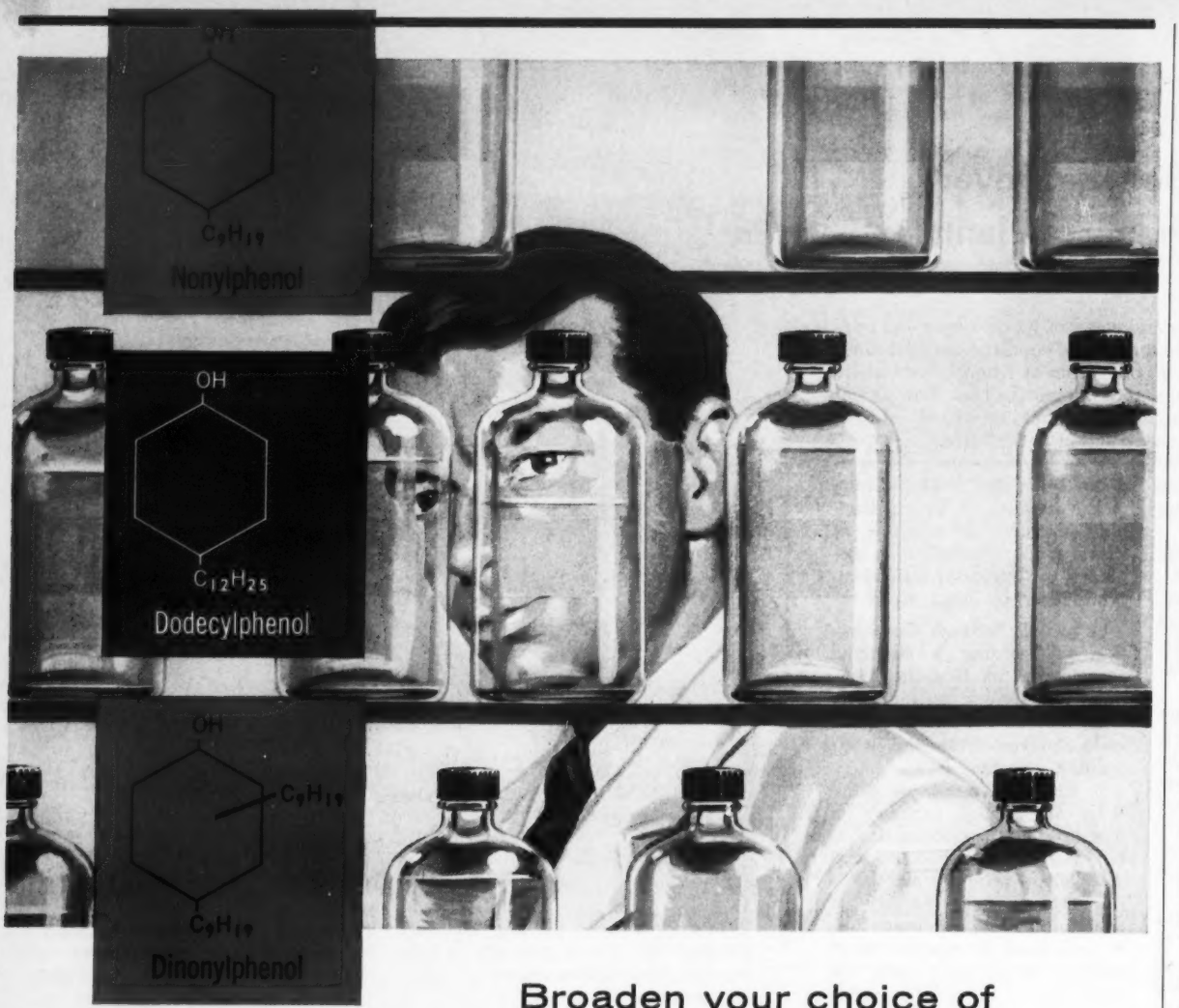
Shawinigan Resins Corporation is expanding by 100 percent its production capacity for polyvinyl alcohol resins.

Abbott Laboratories is building a plant at Wichita, Kan., to produce cyclohexylamine used in the manufacture of its non-caloric sweetener.

Chemetron Corporation's Cardox Division has under construction a plant at Gibbstown, N.J., to recover carbon dioxide from ammonia. Capacity will be 155 tons of liquid and solid CO_2 a day. Raw material will be obtained from a nearby Du Pont ammonia plant.

Chemetron's Girdler Construction Division is erecting a hydrogen plant for Wesson Oil & Snowdrift Co., Inc. at Memphis which will produce 325,000 cu ft a day of the 99.6-percent-purity gas. Facilities are due to go on stream this winter.

Air Products, Inc. is planning to install oxygen-producing facilities for the steel industry at Pittsburgh, Cleveland, Granite City, Ill., and Weirton, W. Va. Oxygen produced in these facilities will



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Check 2278 opposite last page.

be equal to about 50 percent of all oxygen consumed by the steel industry in 1958. A company spokesman said total investment exceeds $33 million. Air products will build and operate the four plants.

Consolidated Mining and Smelting Company of Canada Ltd. is building a urea plant at Calgary. Capacity will be 100 tons a day.

Anderson Chemical Company, division of Stauffer Chemical Company, is producing commercial quantities of aluminum acetylsalicylate, or, as it is commonly termed, aluminum aspirin, in a new unit at its Weston, Mich., plant.

Commercial Solvents Corporation has substantially increased production of methanol at its Sterlington, La., facilities.

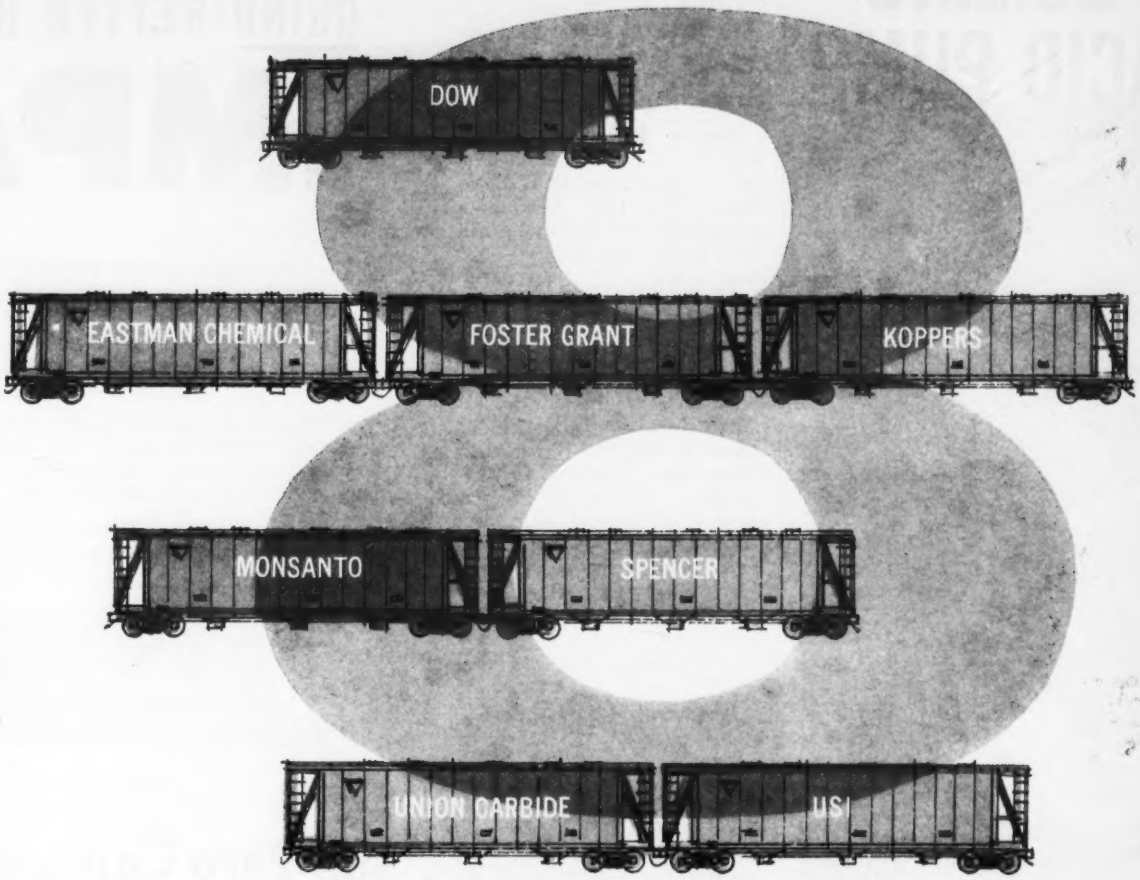
Epoxylite of Canada, Limited has been formed to supply specialized epoxy-resin compounds to the Canadian market. Production facilities are at Fort Erie, Ontario.

The Firestone Tire & Rubber Company has purchased a manufacturing site at Hopewell, Va., to be devoted to production of synthetic fibers, the first of which will be nylon. Polypropylene resin also will be made there. Production is scheduled to begin late next summer.

Arthur C. Trask Co. is building a new plant and warehouse in Chicago. The firm, headquartered there, is a manufacturer and distributor of tanning extracts, silvichemicals, and imported and domestic specialty and bulk chemicals.

Vitro Corporation of America has formed the Vitro Chemical Company as a subsidiary. It will consolidate chemical and metallurgical operations in the United States, including those conducted by Vitro Uranium Company, Heavy Minerals Company and Vitro Rare Metals Company.

Thompson-Hayward Chemical Company is consolidating plant, warehouse and headquarters operations in a five-



8 major chemical companies are now using the **DRY-FLO® CAR** for bulk shipment of **POLYETHYLENE** and **POLYSTYRENE**

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The Dry-Flo® car provides maximum sanitation and full protection for materials that require careful handling.

Check 2279 opposite last page.

year, $4 million-program under way at a recently acquired industrial tract in Wyandotte county, Kansas.

Bunker Hill Company is building a multi-million-dollar fertilizer plant in Kellogg, Idaho. The first unit — a phosphoric acid facility — will have a starting capacity of 130 tons a day.

General Mills, Inc has acquired the business and assets of Magnaflux Corporation of Chicago, a pioneer in development of techniques and equipment for detecting hidden flaws in industrial materials. The action, which makes Magnaflux a wholly owned subsidiary of General Mills, was termed by a GM spokesman as a "major step in long-range plans for diversification."

Foreign Plants

Reichhold Chemie A. G., Swiss affiliate of Reichhold Chemicals, Inc., has under construction a $2.5 million phthalic anhydride plant at Hausen bei Brugg, Switzerland. Scheduled to go on stream early next year, the plant will have a capacity of 10,000 tons annually.

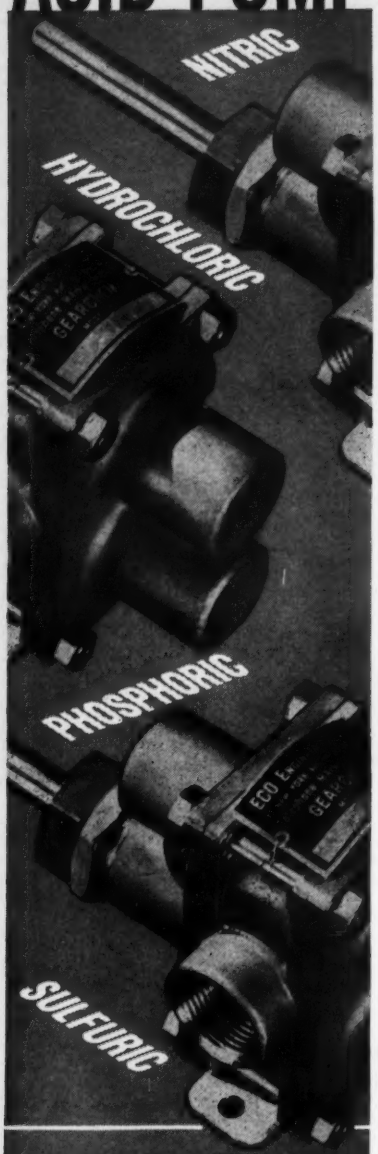
Dow Chemical International Limited S. A. and **Pechiney S. A.** have undertaken a joint venture for construction of a multi-million-dollar plant to manufacture polystyrene and vinylidene chloride copolymer. The facility will be located at Ribecourt, near Paris, and will be operated by a newly formed French company, Plastichimie S. A., owned jointly by Dow and Pechiney. Operations are expected to begin in 1961.

Monsanto Argentina S. A. I. C., wholly owned subsidiary of Monsanto Chemical Company, is installing facilities to produce polyvinyl chloride plastic compounds at its plant near Buenos Aires. Operations are expected to begin in the first quarter next year.

Texas Butadiene and Chemical Corporation has been given official Argentine government approval to invest $39

To page 22

BOILING ACID PUMP



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RECENT APPLICATION

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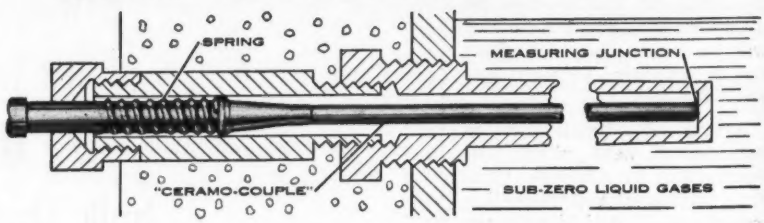
Check 2281 opposite last page.

Sub-Zero Ceramo-Couple Solves Condensation Problems



"Ceramo" versatility has also solved a key problem of *sub-zero temperature measurement*—condensation. Caused by wide temperature differences between ambient temperatures and the thermocouple measuring point, condensation can penetrate thermocouple insulation and short out conductors.

Overall Metal Sheathing of "Ceramo" thermocouple wire completely encloses conductors and ceramic insulation—shutting out moisture effectively. Sheathing itself is stainless steel or other corrosion-resistant material.

Spring-Loaded Construction of T-E's sub-zero probe holds contact point firmly against thermowell end—counteracting effects of expansion and contraction from temperature changes.

Applications—Liquid oxygen, nitrogen, ammonia and similar applications. Conductors are either Copper-Constantan or Chromel-Constantan for measuring temperatures as low as —320° F.

Write For Bulletin 52-R

Thermo Electric CO., INC.
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Check 2282 opposite last page.

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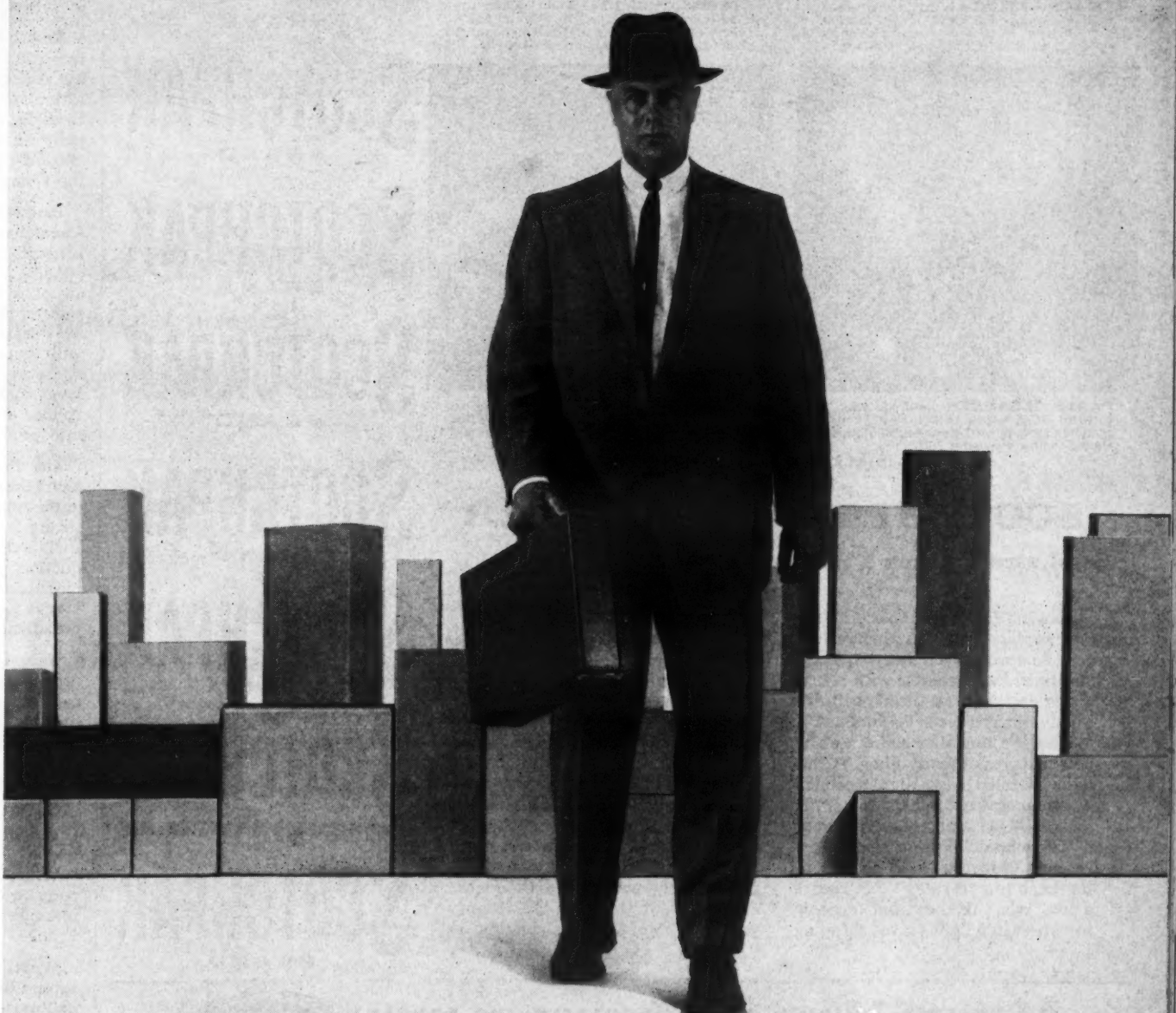
Whether you're on Broadway or Main Street, there's a friendly G-Man nearby to help you avoid costly dead-ends. Call him today.



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HEADQUARTERS, ST. LOUIS
PLANTS COAST TO COAST

DIVISION OF **Crown Zellerbach Corporation**

For more information on product at right, specify 2283 see information request blank opposite last page.

LIQUID DETERGENT is safely packaged in envelopes of "Scotchpak". Tests on polyethylene and other film laminates showed seam leakage. "Scotchpak" holds tight.

STRONG CHEMICALS—in liquid or dry form—can be packaged in "Scotchpak". Film resists puncturing and tearing, can be printed easily—no anchor coat needed.

PASTE CLEANSER shelf life was extended 50% when this manufacturer switched from polyethylene to "Scotchpak" Heat-Sealable Polyester Film.

SAMPLES of almost any inorganic or organic compound can be sealed in envelopes of "Scotchpak". Transparent packages are easy to handle, easy to ship and store.

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HEAT-SEALABLE POLYESTER FILM
SCOTCHPAK BRAND

"SCOTCHPAK" TAKES OVER

and streamlines a multitude of packaging jobs!

Looking for a film that's *tough*, clear as glass—one you can freeze or boil? And would you like that same film to be heat-sealable with a seal that's as tough as the film itself? Then your answer is "Scotchpak".

Here is a film that combines the best features of many films. It can be heat-sealed in less than 2 seconds—a temperature of 300° to 400° F. and 20-60 psi is all that's required.

"Scotchpak" Film resists freezing cold (down to -70°F.) and boiling heat (up to 240°F!). It resists acids, oils, alkalies and organic solvents. It is light (saves shipping costs!) and compact (saves space in shipping and on the shelf, too!).

"Scotchpak" is now available in roll-stock widths up 50 inches—from 2 mils to 4.5 mils thick, ready for printing—if you desire. It can be easily handled on conventional bag making and filling equipment.

Our Customer Service organization is ready to work with you—to show you how "Scotchpak" can solve your film fabrication and packaging problems. For complete information, write Film Products Group, Dept. CAE-129, 3M Company, St. Paul 6, Minnesota.

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MINNESOTA MINING AND MANUFACTURING COMPANY

...WHERE RESEARCH IS THE KEY TO TOMORROW

3M COMPANY

Check 2284 opposite last page.

CHEMICAL BUSINESS

From page 20

million to build a plant in Santa Cruz, Patagonia, to produce butadiene, synthetic rubber and lamp black.

Alba, S. A., a subsidiary of Borden International, Ltd., has put into production a synthetic methanol plant near Cubatao, Brazil. It is producing 30 tons a day of 99.95-percent methanol, which in turn is used in the production of formaldehyde.

Amoco Fina S. A. was formed recently. It is owned jointly by Amoco Chemicals Corporation and Petrofina S. A., Brussels, Belgium. The company will manufacture and market petroleum additives in the Common Market.

Australian Synthetic Rubber Company, Ltd. has awarded a contract to Fluor International, S. A. to engineer and construct a $10-million synthetic rubber plant. The facility, to be located near Melbourne, will copolymerize butadiene and styrene to produce 30,000 long tons of GRS synthetic rubber annually. Plant will go into production in 1961.

The Firestone Tire & Rubber Company will establish a multi-million-dollar manufacturing operation in France. Included will be a tire production plant and facilities to manufacture special synthetic latices and copolymers of butadiene and styrene.

Oulu Osakeyhtio has begun production of chlorine and caustic soda at the northernmost chlorine plant in the world. It is located in Oulu, Finland, at the northern extremity of the Gulf of Bothnia.

Du Pont de Nemours (France) S. A. has been formed as a wholly owned subsidiary of the parent company to contract for the manufacture of weed killers in France.

W. R. Grace Co. and **Gonzalez Chemical Industries, Inc. of Puerto Rico** have signed an agreement under which Grace will manage and operate the Gonzalez ammonia and ammonium sulfate plant at Guanica, Puerto Rico.

Why They Read CHEMICAL PROCESSING One of a series

I. A. Davis, Chemical Project Engineer, (left) and A. J. Karner, Senior Design Engineer, (right) find Chemical Processing the best source for ideas, equipment and general layout for new plants

CHEMICAL PROCESSING Helps Wyandotte Chemicals make better products

Publication aids engineers in selecting most modern equipment and utilizing latest ideas — they like CP since it provides thorough, concise information and shows how equipment is actually used in a plant

One of the large chemical complexes in the country, employing about 3500 men, is located at Wyandotte, Mich., just outside Detroit. The Wyandotte Chemicals Corporation plants there produce chlorine, caustic, calcium carbonate, glycols, wetting agents and detergents, and various organic intermediates.

The Wyandotte Engineering Department uses CHEMICAL PROCESSING as an aid in its work.

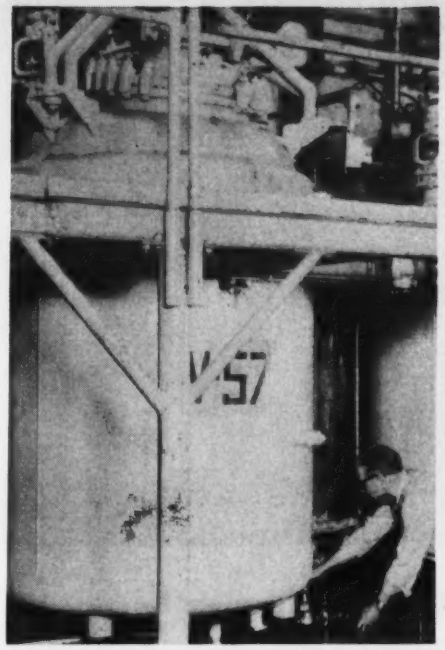
An example of how CP is used in Engineering Department is shown by comments of I. A. Davis, Chemical Project Engineer, and A. J. Karner, Senior Design Engineer. These men work as a team in designing and constructing chemical processing equipment. They recently completed an expansion of Wyandotte's Oxide Products Plant.

Mr. Davis comments as follows:

"We have found CHEMICAL PROCESSING to be a quick guide in the selection of process equipment and a fine source of information on new process equipment. We rate it high among such publication."

Mr. Davis has a B.S. degree in Chemical Engineering from the University of Toronto. He has been reading CHEMICAL PROCESSING since 1948. His teammate, Mr. A. J. Karner, Senior Design Engineer, has this to say about CP.

"We find CHEMICAL PROCESSING to be thorough and



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When you work with corrosive acids and/or mild alkalies, you can eliminate the variables of process environment by using Glasteel reactors *all the way* from research to pilot plant to full-scale production.

You can get Glasteel reactors with 1-gallon capacity or as large as 4000 gallons . . . all made from Glasteel 59, which resists all acids (except hydrofluoric) and all the mild alkalies.

Glasteel 59 reactors also give added insurance against thermal shock . . . 30% more resistance than the best previous glassed steel. Operating temperatures to 450° F.

Lab Sizes: 1, 2, 3 gal. From vacuum to 750 psi.

P Series: 5 to 100 gal. 25 psi; 150 psi also available through 50 gal.

E Series: 50 to 2000 gal. 25, 50, and 100 psi through 750 gal.; 75 psi on larger sizes.

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Popular sizes are pre-stocked for ten-day delivery.

Alloy reactors. A complete line of reactors is available in stainless steel and other alloys to solve specific corrosion problems.

Wonder metals. Need a reactor of tantalum, titanium or zirconium—lined or solid? Pfaudler Permutit craftsmen are skilled in fabricating these metals, as well.

New FLUIDICS Buyer's Guide. You can get more specific data on these reactors and other products and services offered under the FLUIDICS program for solving problems involving fluids. Write our Pfaudler Division, Dept. CP-129, Rochester 3, New York for a copy of Bulletin 980.

FLUIDICS is a Pfaudler Permutit program which provides a modern, imaginative approach for handling and processing more profitably liquids and gases.

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Specialists in FLUIDICS . . . the science of fluid processes

Check 2285 opposite last page.

concise in coverage of our industry. The illustrated applications of equipment are very helpful. Quite a few men in our department read CHEMICAL PROCESSING."

Mr. Karner has a Bachelor of Mechanical Engineering degree from the Detroit Institute of Technology. He has been reading CHEMICAL PROCESSING since 1950.

Both Mr. Davis and Mr. Karner report that they use the Reader Service slip in CHEMICAL PROCESSING as well as write to companies directly for further information on processing equipment.

Next month . . .

- **A LOOK INTO THE '60s**
- **CONGRESSIONAL PREVIEW**

A momentous decade is shaping up with the start of the new year—10 years which very well could be among the most important in the nation's history. What will be CPI's role in this fast-moving era?

To get the answer to this and other questions pertinent to the continuing progress of the industries we serve, CHEMICAL PROCESSING asked various leaders to use their "educated imaginations" on what's ahead between 1960 and 1970.

Their forecasts cover a gamut of topics—Research and Development, Sales and Marketing, Economics, Financing, Advances in Technology, Foreign Expansion.

They're hard-hitting, terse, straight-from-the-shoulder viewpoints by experts who write with authority backed by years of experience on the firing line.

An extra bonus in January's Chemical Business section will be provided by Joan Marziotti, CP's Washington reporter, as she previews Congressional action expected to affect the chemical processing industries. Her informative word picture will give you a ringside seat at the doings on Capitol Hill.

These and hundreds of other articles will make the January issue of CHEMICAL PROCESSING an exciting experience in reading.

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But, quality isn't the whole story. When you call Cambridge for industrial wire cloth, you also get service . . . prompt answers to your inquiries . . . quicker deliveries . . . and an experienced Field Representative who follows up your order to make sure our product is giving you the best possible service. Let us quote on your wire cloth needs. We manufacture wire cloth from any metal or alloy—including titanium—in nine basic weaves. Very likely, we have what you require in our warehouse right now. For samples or more information, call your Cambridge Field Engineer...he's listed in the yellow pages under "Wire Cloth". Or, write for FREE 94-PAGE CATALOG.
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Check 2286 opposite last page.

THAT'S INTERESTING

Electrical toughener

Electricity may play a big role in increasing tensile strength of commercial plastic materials and improving their electrical properities.

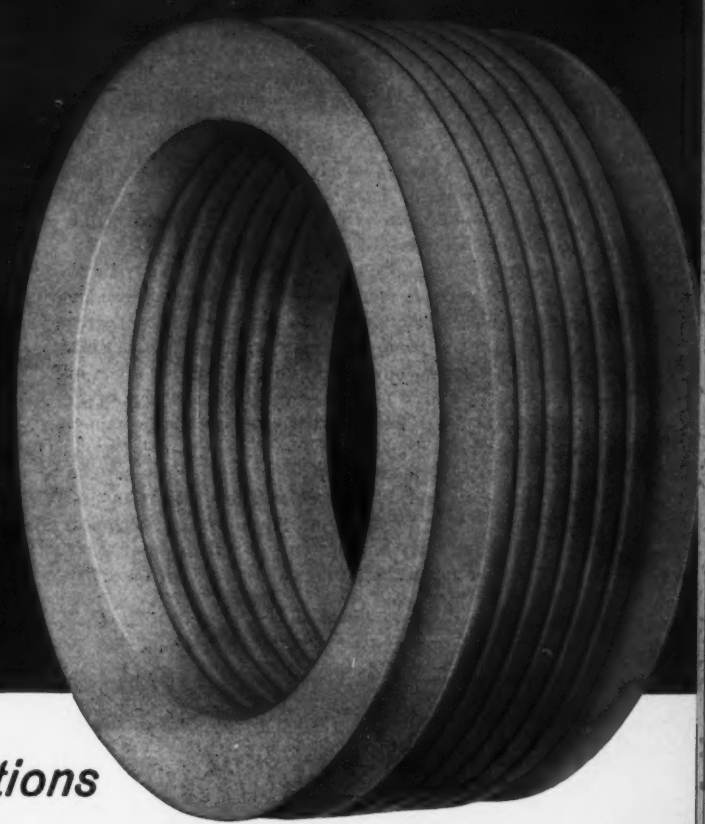
Armour Research Foundation scientists have found that processing a plastic such as polystyrene in an electrical field at the same time it is subjected to external heating increases its tensile strength about 25%.

Foul!

Though baseball is in limbo until spring, here's something to talk about in the "hot stove league." Long ball hitters can be robbed of home runs in cold, dry air and increasing barometric pressure. Why? Because on a cold, dry day the air is more dense than on a hot, humid day.

For more information on product at right, specify 2287 see information request blank opposite last page.

MORE OF THE GARLOCK 2,000



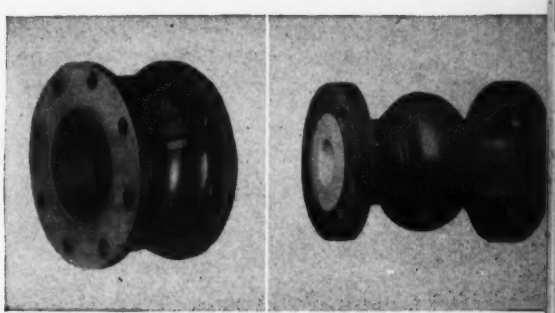
Under corrosive conditions

Protect expensive piping from shock, vibration damage

Garlock All-Teflon* Expansion Joints act as a cushion to absorb pump, compressor, engine and pressure surges . . . prevent stress, compensate for misalignment, reduce flange breakage . . . for service to 75 P.S.I. against solvents, acids, caustics. **Teflon-Lined Expansion Joints** are recommended where pressures rise as high as 125 P.S.I.

Garlock All-Rubber Expansion Joints offer the same fine performance against water, mild acids and caustics, or exhaust steam at temperatures to 180°F, pressures to 125 P.S.I., depending on the size of the joint.

Expansion joints are another important part of "the Garlock 2,000" . . . two thousand different styles of packings, gaskets, and seals for every need. The only complete line. Ask your Garlock representative for his recommendations, or write for Expansion Joint Catalog AD-137.



Garlock All-Rubber Expansion Joint (left) and Teflon-Lined Rubber Expansion Joint (right).

*DuPont Trademark for T.F.E.-fluorocarbon resin

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Solvents to fit your formulation –just specify the properties you need

Among the high-quality glycol-ethers, esters, alcohols or ketones available from CARBIDE, there is one—or a combination—that is just right to give your product the best balance between cost and performance.

Your solvent might be one—or several—of CARBIDE's 11 CELLOSOLVE and CARBITOL glycol-ethers. Their non-foaming property, high solvent power, low viscosity and low degree of odor make this group of solvents suitable for use in easy-spreading, color-retaining latex paints. If you use esters in your formulation or process — you have a choice of 25 CARBIDE esters — for example, ethyl acetate, isopropyl acetate, or butyl acetate. And, for a wide range of applications—from lacquers to drug extraction—there are two dozen alcohols and 14 ketones available from CARBIDE.

Whatever your product, there is a trained Technical Representative ready to help you select the solvent that's best for your application. You can balance your inventory and production schedules by ordering the quantities you need, quickly shipped in drums—LCL or carload lots, in tank wagons, in compartment tank cars, or 4,000 to 8,000-gallon tank cars from one of our warehouses, bulk storage stations, or plants—a total of 72 shipping points—across the country.

To help you choose the best solvent, coupler, plasticizer or diluent for your requirements, we've prepared a six-page booklet, the "Solvent Selector." Ask for a copy from your Technical Representative or write Union Carbide Chemicals Company, Division of Union Carbide Corporation, Room 328, Dept. HP, 30 East 42nd St., New York 17, N. Y.

UNION CARBIDE CHEMICALS COMPANY

DIVISION OF UNION CARBIDE CORPORATION

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The Depreciation Dilemma — How CP Readers Would Solve It

T. C. DAVIS' article in September CP (page 30) attacking the government's depreciation and tax policy as "unwise and unsound" stirred considerable comment by readers.

Many agreed with his premises. Some offered plans for correcting the condition. Others expressed grave concern over the mounting peril of inflation. One reader, critical of his colleagues who "spend all their time in technological and management improvements," advocated they do something about influencing the government toward "sound fiscal policies."

CHEMICAL PROCESSING is gratified with reader response to this provocative topic. We hope the comments printed below (a part of those received) will help stimulate other readers' thinking on what the current depreciation policy and inflation are doing to the chemical processing industries.

"Sound and solid in his conclusions" is the way Wm. C. Jones, controller, Alabama By-Products Corporation, Birmingham, described the Davis article. He wrote:

It is hardly reasonable to assume that business can do an efficient and fully effective job of keeping pace with rising national consumer needs under present tax allowances for depreciation. The tax philosophy of measuring gross revenues by inflated standards while permitting legitimate deductions at many times less than the inflated standard is completely unsound and unwise.

Regardless of the accounting concept as accepted by that profession, businessmen are faced with a very real problem of providing cash for new facilities to replace those worn out and to build new plants and additions.

This is highly important to our expanding economy and something should be done to measure present realistic and actual costs for tax purposes in terms of current values.

Unless this is done in a reasonable and practical way, business progress and ability to keep pace with our economic needs must necessarily continue to be severely handicapped.

A two-point program is advanced by R. E. Withrow Jr. of The Dow Chemical Company's treasury department. Here's what he has to say:

Representative Keogh (D., N.Y.) introduced a bill, H. R. 131 [to amend the Internal Revenue Code of 1954 to provide for reinvestment depreciation deductions] during the last session of Congress which was designed to alleviate the inflation-depreciation problem.

From a practical standpoint, I believe this proposal was unsatisfactory and I was not disappointed to see it die in committee. It is gratifying, however, to know that somebody in Congress is convinced that there is a problem

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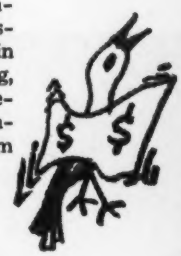

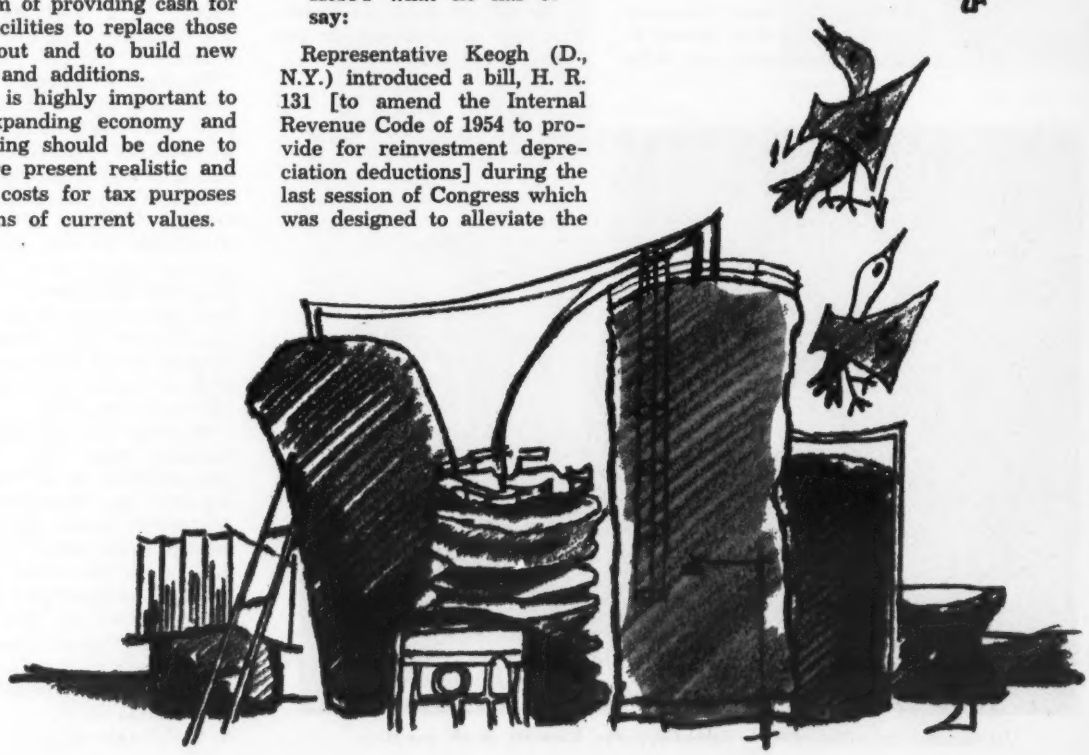

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Starting as a new chemical venture in 1949, National Distillers has built an enterprise that is recognized as one of the fastest growing in the industry. This story tells how it grew . . .

from Bottles to Bigtime Chemicals . . . as

NATIONAL DISTILLERS

Approaches 10th Place in Chemical Company Profits

JOHN MELLECKER, Editor East

It can be done. Able people can still create a dynamic, industrial chemical giant. Prerequisites: Imagination, technological and financial ability and courage, and a sound, dividend-producing company to serve as equity for needed $millions$.

Within the last decade the story of one of the chemicals giants so ventured — National Distillers — may go into the records of history as truly a saga of American industrial chemical achievement.

The team of able people who have led their company to such heights are: Robert E. Hulse, technologist, and John E. Bierwirth, financier. N-D's chemical operations are now collectively known as U.S. Industrial Chemicals Co., division of National Distillers and Chemical Corp.

Starting with no chemical activities in 1949, N-D's USI division will this year rack up an impressive $133 million (est) gross sales. In 1960 the net profits from chemicals are expected to overtake those from N-D's liquor operations — an event long awaited by the chemicals men.

If the forecasters are right, N-D will in 1960 also move into 10th place among the industry's big profit earners.

USI executive committee—(left to right) Coppedge, Bierworth, Marsh, and Hulse

Move into Polyethylene

Most prolific contributor to the present rosy earnings picture is polyethylene. N-D managed to rush into manufacture of the high-pressure material soon after an anti-trust decision made the ICI process available. N-D's team moved so fast that they were able to start commercial deliveries from one to six months ahead of others similarly entering the field. This lead time is said to have enabled USI to become the third source of supply in a field previously and exclusively served by two others.

Through a fortuitous combination of intention, hard effort and good luck, Hulse's hand-picked engineering team managed such rigorous control over the polymerization as to enable delivery of coveted film-grade resin only two months after plant startup. For his contribution to this and other feats, Hulse's polymer expert Ralph Knight was recently made USI vice president in charge of long-range polyolefin planning.

Meeting the sharply rising demand was still another problem to be dealt with. Here again the Hulse-Bierwirth leadership moved rapidly and boldly. Even before construction of the first plant got underway, its scheduled capacity was doubled. By the end of 1957, the Tuscola plant's capacity was four times that called for in original plans: 100 million lb/yr.

Early this year, a second plant (at Houston) was brought on stream, upping the total to 175 million. By year's end, this plant will have added another 25 million. At the same time, work is under way to raise the company's total to 300 million by mid-1960. Another new plant may soon be announced — to be at an undisclosed eastern location.

New Sales Approach

Marketing plans for chemicals and petrochemicals in 1954 were based on concept of a few large volume customers with long-term contracts. Soon, however (by mid-1955), indications were clear that polyethylene couldn't be sold that way. Instead, resin properties must be "tailored" to enable large numbers of molders (or fabricators) to economically turn out products of both attractiveness and durability. Selling to such a broad market was a technique familiar to the USI sales force. On the other hand, polyethylene and its market represented unfamiliar areas. Hulse had this solution to the problem: Turn the polyethylene sales over to the USI sales force, and get a man experienced in polyethylene sales and give him the job of orienting and guiding the salesmen. The man found to be ready and waiting for such an assignment was Vince McCarthy, whose experience (like others) went back to early days with Du Pont.

McCarthy swung right into action — to keep up with

soaring plant capacity. With development v-p Frank Olmsted, the market was redefined. With production v-p Bob Cornwell, the available custom grades of resin began climbing, now to more than 70. A compounding plant was set up and put into service. "It really began to sink in that sales efforts were appreciated by top management when I'd get back from trips and hear that plant capacity had been upped again," recalls McCarthy. "Of course, I had something to do with it — every time they'd ask what I thought they ought to do I'd say, 'Give us more.'"

In 1956, USI developed for Kordite, then an independent fabricator but later acquired by N-D, a resin suited for garment bags. Soon USI began to get a lion's share of the vast garment bag resin market.

In addition to having the right materials at the right time, Al Ludlow, now USI vice president sales, credits these factors as having important influence on USI's polyethylene success: First, the USI sales policy of rendering personalized service to every customer — big or small. Second, the educational, "soft-sell" ad and publicity campagin waged by ad-publicity coordinator Phil Gisser.

Selling 15 million lbs of polyethylene in 1955, sales were pushed to 46 in 1956, 72 in 1957, and 98 in 1958. It is expected that 150 million lb will be the score for this year.

How It All Started

The initial move which got conservatively successful liquor-maker National Distillers into the chemical business was the election in 1949 of John Bierwirth to the presidency. This took place at the behest of N-D's long-time president, Seton Porter. Only a few weeks before, Bierwirth, then president of New York Trust, had agreed to the appointment only if he could have a free hand to put N-D solidly in the chemical business. At that time it wasn't difficult to see that liquor had just about run its wartime boom, had little opportunity for rapid growth.

Besides Bierwirth, Seton Porter is credited with having also hand-picked another man, Bob Hulse. Porter and Hulse became acquainted when Porter was in the throes of taking over Du Pont's Ashtabula, Ohio, sodium metal plant project. It was intended to supply growing needs of the tetraethyl lead manufacturers. For a total investment of $12 million, Porter got N-D into the chemical business, but without the need for specialized know-how, a sales force or other normal appurtenances.

N-D's sodium deal soon set off rumors of impending moves into other chemical areas. Porter apparently realized that he had better start acquiring some able chemical men. So, just as he snapped up the sodium deal, he likewise lost no time in hiring Bob Hulse — who, incidentally, intended to return to research. Hulse, a 19-year veteran of Du Pont research and production management (at Niagara Falls), started the rapid expansion of N-D's R&D Center at Cincinnati.

A mature executive with unwavering optimism, "Jack" Bierwirth brought to N-D a sound banking background plus top contacts with big businessmen. He had a reputation for choosing growth companies that succeeded.

New Role — Petrochemicals

Bierwirth was attracted to the quiet air of competence he found about Hulse. One day, he asked Hulse which additional field of chemical endeavors N-D might do well in. "Petrochemicals," Hulse replied. Hulse then told how he had figured that ethylene derivatives offered great potential for future growth.

"What raw material?" Bierwirth asked. "Natural gas," Hulse replied. This was 1950. "I've just the company for this — Panhandle Eastern Pipeline. I'm a director and know

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HULSE'S TEAM

Schott

Knight

Olmsted

Cornwell

Ludlow

Johnson

McCarthy

Stanton

Gisser

Exclusive CP Survey Report:

The Food Additives Amendment—

protection of the 'public interest' . . . for a price

The death knell of self-regulation in the food-packaging field, in the matter of consumer-consumption safety, was sounded on September 6, 1958, by the enaction into law of the Food Additives Amendment to the Federal Food, Drug and Cosmetic Act.

This law prohibits the use in food of additives ". . . which have not been adequately tested to establish their safety." Since a migratory packaging component is considered a food additive, the law is having an immense impact on film suppliers and manufacturers of film components.

How do these concerns view the situation? A survey of their opinions, conducted by CHEMICAL PROCESSING, can be summarized as follows:

1) Responsibility for testing—A majority feel that the mantle of testing duties will fall jointly on the shoulders of the film manufacturers and chemical manufacturers producing film components.

2) Contracts between packagers and film suppliers—It is generally agreed that maintenance of rigid quality control on the part of film suppliers will become increasingly important, particularly once FDA approval has been granted for a certain formulation in a specific application.

3) Cost of testing—Packagers and film manufacturers expect to share the burden of necessary testing expenditures.

4) Testing as a competitive tool—Most companies seem to feel that competition between film manufacturers will produce a situation, wherein the testing operation will be offered as a service to accompany the purchase of film material. In fact, the thinking here is that pre-tested and pre-approved film will be offered for specific uses.

5) Effect on progress in packaging field—It is anticipated that the complex and costly testing procedures required very well may stultify new developments.

Not Unanimous

As might be expected, diverging opinions and variations in outlook exist on all the above points. This seems due, in part, to a lack of complete understanding as to just exactly how stringently the law will be interpreted and enforced. In general, industry seems to be "playing it by ear," and, in some respects, the Food and Drug Administration doesn't seem to be much more than one step ahead.

In the opinion of G. W. Ingle, of the Plastics Division of Monsanto Chemical Company, "A great deal of work will be necessary to clarify both legal and technical aspects of compliance . . ."

Who Conducts Tests?

The question of on whom the burden of testing proof falls is a ticklish one at best. Elson B. Cahn, Vice President of Visking Company, Division of Union Carbide Corporation, states that, "We believe that the responsibility for testing will be shoved to the film supplier by the packager if the film supplier is willing to accept it." He also maintains that, "The responsibility for compliance with the law, however, would still appear to remain with the packager."

In the sense that it does not point a finger at the chemical manufacturer producing film components, this feeling is echoed by William E. Thompson of the Public Relations Department of United States Rubber Company. His belief —"The responsibility for testing film outlined in the 1958 Food Additives Amendment to the Federal Food, Drug and Cosmetic Act, can't rest with the raw material manufacturer. In our opinion the raw material supplier has no control over the final formulation used in the film, and the production techniques used, unless he happens to be a film manufacturer himself."

An opposite tack is taken by Monsanto's Ingle. He reasons that ". . . of all the participants in this chain of re-

THE LAW

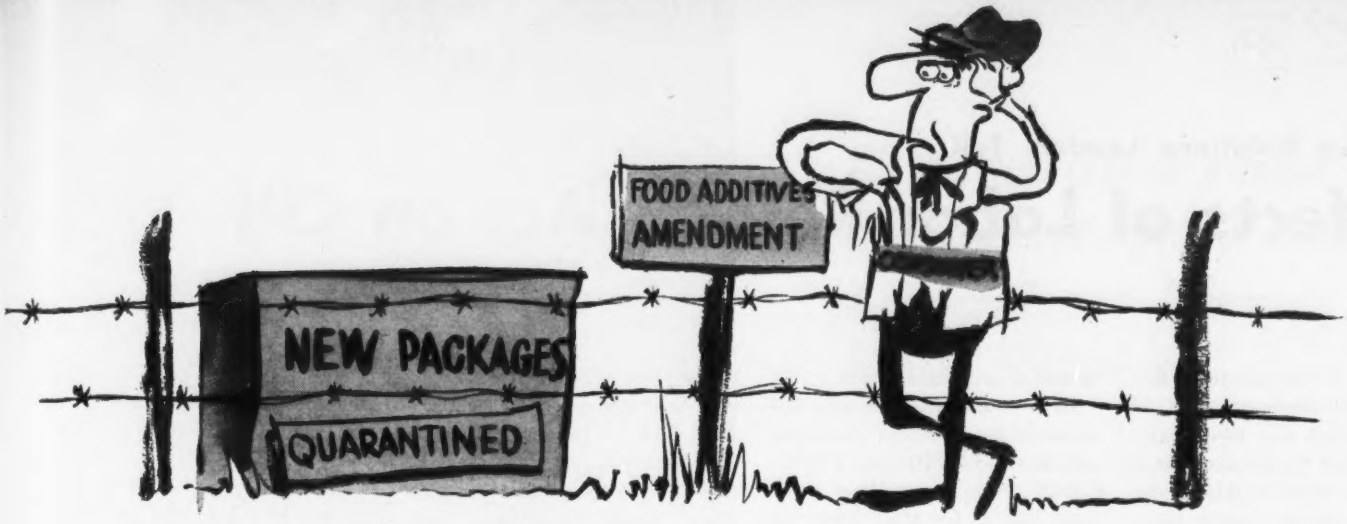
On March 5, 1959, the first condition of Public Law 85-929 went into effect. This law, commonly known as the Williams Amendment, prohibits use of any packaging materials, which have been placed in use since January 1, 1958, if they have not been cleared under provisions of the law. On March 5, 1960, the final condition becomes effective. This will bar use of any non-cleared food-packaging material.

The Food and Drug Administration may extend this time limit until March 5, 1961, if it feels satisfactory testing progress is being made. There are certain materials which have prior sanction and will not require additional approval. This group, however, is limited.

When the solubility of a packaging material in foods is not known, it must be determined by one of two methods: 1) Storage for a normal marketing period, followed by an analysis; or 2) Conducting extraction tests with recommended solvents.

In the case of migration, additional testing is required. The migrating chemicals must be identified and measured. If the Food and Drug Administration has evidence that these migratory agents are safe, then no further testing is necessary. If not, animal-feeding tests must be conducted.

The first of these tests—for acute toxicity—are to determine adverse effects on animals in a 24-hour period. Second tests—for sub-acute toxicity—are to determine functional changes in animals over a six-month period. Final tests —for chronic toxicity—require two years and are to determine whether or not ingestion of small amounts of agents over long periods of time is detrimental to animals. Results of all tests are then incorporated in a petition to the Food and Drug Administration for approval.



sponsibility only the raw material supplier has real understanding of the chemical nature of the plastics package. For this reason, I think, the bulk of migration testing will be determined by the raw materials supplier."

When all the dust has settled in this controversy, a cooperative venture by all concerned will probably be required. Such a conciliatory note is sounded by T. W. Sharp, Director of Product Marketing for Union Carbide Plastics Company, Division of Union Carbide Corporation. He submits that, "Each producer of a product has a basic responsibility for the toxicological hazards of the products they produce and sell, whether they be the raw material supplier, the converter and fabricator, or the food packager."

Cahn of Union Carbide also points the way down the road of cooperation in saying that, "Practically, the testing has to be a cooperative venture between the packager and the film supplier since neither has enough information on his own to assure compliance with the law or even to lay out a suitable test program."

A Costly Procedure

The cost of required testing, like the responsibility for testing, seems to be a hot potato. Many would saddle the film manufacturer with this bill.

On the other hand Henry W. Devore, Director of Plastics and Resins Sales for the Plastics and Coal Chemicals Division of Allied Chemical Corporation, surmises "If the pattern which has already been set in the industry continues, all of the chemical testing work and all of the toxicity testing work will be handled by the manufacturer of the raw materials used in the manufacture of the film.

"Although it would seem fair for the film manufacturer to bear some of the cost, history has not indicated that processors in general are willing to do so and we are quite sure that the food packager would not even consider paying any part of the cost as long as even one manufacturer would offer him a material already tested and approved."

A possible solution to the cost problem is pointed out by an official of the Polymer Chemicals Division of W. R. Grace & Co.: "Packers and film producers can probably have the cost borne by mutual participation in their own trade associations' testing programs."

Of course this discussion is only apropos for the immediate situation. In the long run, as usual, John Q. Public will bear the full brunt of testing expenditures. In the words of George E. Ham, Technical Director for the Plastics Division of Spencer Chemical Company, "It is conceivable that as additional testing costs are incurred, such costs may ultimately be borne by the person enjoying the additional protection, namely the consumer."

A very real possibility exists that the complex, costly testing procedures required to obtain approvals will stultify progress in the packaging field. The tendency to "stick with a winner" may well predominate. If this eventuality materializes, the small man, without large research and testing facilities and the cash reserve to operate them, will really feel the pinch.

According to one individual in the Polymer Chemicals Division of W. R. Grace & Co., "Many new materials, especially those developed by smaller firms, will not go as rapidly because they may think twice before spending the money required. In general, main responsibility will be on the basic raw material producers. Compounders or converters will be hit hard because even though you mix A and B and each have approval separately, the mixture must still be approved as a new composition C. Therefore, you are going to see less 'additives.'"

Opinion on this is not unanimous. Mr. Ingle doubts "that testing procedures required to obtain approval will slow down progress in the field of packaging. Ingenuity on the part of researchers assigned the problem of improving one or more properties important in food-packaging films, in addition to that of toxicological safety, will find ways of solving these problems."

A specific example of anticipated progress delay is cited by Allied Chemical's Devore: ". . . Allied Chemical Corporation produces caprolactam type nylon, and much effort has been devoted to developing this material in a film form.

"We dislike the possibility of sitting by two years while our nylon materials are studied prior to our being able to sell these materials as food packaging. The maintenance of a development program over a long period of time required for toxicity testing will undoubtedly result in drawn-out procedures for the market development of any new film for packaging, particularly, of course, when these films may be applied to food."

The Price of Protection

Out of all this two results seem inevitable: Migratory food-packaging components' toxicities will be tested, and the public will be protected.

Somehow or another, whether it be by individual company or by industry, the packagers, the film manufacturers and the film-component suppliers will resolve whatever differences they have. The products will be tested and approved. The law requires it; competitive survival demands it.

What of the man in the street? That he will be protected is unarguable. However, he will pay a price for this protection. The levy will be exacted in the form of testing-cost dollars and in the lowered rate of packaging progress.

Employee Relations Leaders Tell

Effects of Labor Reform Act on CPI

The Labor-Management Reporting and Disclosure Act of 1959 is the first new labor legislation enacted by Congress in a decade. The intent of this reform legislation is to halt union racketeering and curtail the economic power of organized labor.

To ascertain what the new law means to the chemical processing industries, CHEMICAL PROCESSING asked employee relations leaders for their views on three questions: (1) Do you believe this new labor legislation will help improve CPI management-labor relations?; (2) Do you believe management will be greatly affected by state courts being given jurisdiction over small labor disputes passed over by the National Labor Relations Board?; (3) How do you think this new legislation will affect your company?

Here is a cross-section of views by two of those who replied to CP's series of questions.

GEORGE H. BAKER, Vice President Employee and Public Relations, Wyandotte Chemicals Corporation

One of the most important benefits (of the act) is that legislation affecting labor unions, and opposed by them, was passed by the Congress, thereby indicating to labor leaders the fact that the public will not accept excesses on the part of any organization or group.

In response to the questions stated above, it is my opinion this legislation will not help improve CPI management-labor relations. If the question had been: "Would it improve management-union relations?" my answer would be "Yes."

It is my belief that management-labor relations implies a relationship with the employees of a company; and union relations, a relationship with elected and/or paid union officials, and they are not the same. Improvement of management-labor relations can only come from the parties themselves. Legislation will not improve a poor relationship.

Management-union relationships may be improved in those CPI companies having contracts with the United Mine Workers because Section 201 of the new act repeals the requirement for non-Communist affidavits which John Lewis has refused to sign. As a result, the UMW will receive the same treatment under the NLRB as any other union.

As a result of passage of the act, labor leaders, particularly international officers, are going to be more responsive to the desires and interests of local union members.

The chemical processing industries' management will not be greatly affected by this change (state courts being given jurisdiction over small labor disputes passed over by the NLRB) because the NLRB cannot decrease its previous jurisdiction and in only very exceptional cases will a chemical processing plant be other than in interstate commerce. The effect on those plants that might be under the jurisdiction of state governments will depend largely on the laws of the state in which the plant is situated.

Passage of the act will have little direct effect upon our company except in the one plant where we have a contract with the United Mine Workers. That contract provides for a union shop at such time as the international union is in compliance with the Taft-Hartley Act. The unions with whom we deal have, in general, been in compliance with the objectives of the new legislation. We do feel that public opinion, as expressed by the passage of the act, will be of assistance to us in our dealings with union representatives.

JAMES W. DEES, Director Employee Relations, Stauffer Chemical Company

To anyone who carefully reads the act, it is evident that the dire concern voiced by many labor leaders was unjustified. This law will neither deter nor hamper any legitimate union from carrying on its legitimate activities. But the bill does provide needed safeguards for union members from improper practices of both union officers and employers.

In light of our experience during the months following passage of the Taft-Hartley Act in 1949, we expect many union locals to become temporarily more militant. This reaction to passage of the new law will probably die down when union members find that the new law erects no real barriers to legitimate union activities and aspirations.

Passage of the act should expedite and improve handling of cases for which the NLRB has declined jurisdiction. It permits unions or employers involved in such cases to appeal to local or state boards. Most of the states have machinery to handle labor disputes of this nature in an efficient and satisfactory manner.

The new law will not materially affect our own company because most of our plants are organized by mature responsible unions. We believe, however, that most of the features of the new law are highly desirable. It should effectively prevent secondary boycotts and "blackmail" picketing.

Unfortunately, existence of the law will not in itself insure compliance. Individual members of unions and employers must know their rights and insist that they be respected. It is probable that the unethical union leader will not tell members of their rights.

The individual employee is the primary beneficiary of the new law provided he knows what his rights are.

Every employer should encourage his employees to read the Labor Relations Act of 1949 and the Labor-Management Reform Act of 1959 so they will know their rights and how to protect them.

Obviously, the faulty administration of a law (like the faulty administration of a labor agreement) can nullify the original intent. We hope that administrative interpretations of the new law will be consistent with the intent of Congress — that is, to stamp out abuses which have been found to exist in the labor-management field. At the same time, this new legislation should assist union members to advance their working conditions and living standards in a sensible, constructive manner.

Explosion-proof fluorescent fixtures on one floor of chemical operating building at Eli Lilly

Explosion-Proof Fluorescent Fixtures Lengthen Lamp Life Ten Times

More even light with less power provided by 250 explosion-proof lighting units at Eli Lilly and Company, Chemical Manufacturing Facilities

GORDON WEYERMULLER, Associate Editor

Problem: Incandescent lamps enclosed in explosion-proof fixtures and operating continuously have the life of only about 750 hours. Vibration further reduces lamp life. Under these conditions maintenance costs are high for lamp replacement.

When Eli Lilly's new chemical manufacturing plant was being planned at Lafayette, Indiana, a lighting system that would overcome some of these disadvantages was desired. Because a wide variety of solvents is used in the manufacturing of chemicals, the lighting that was installed had to meet the Class I, Group D requirements.

Solution: About 250 EFH explosion-proof lighting fixtures were installed in the new chemical manufacturing facilities in 1958. The 120 volt, 2/40 watt rapid start fluorescent lighting fixture was selected as the more economical unit for the four-story chemical manufacturing building.

These fixtures are factory sealed, eliminating the need for external seals. Lamps are enclosed in a sealed Pyrex-brand glass envelope, and the terminal and ballast are enclosed in a cast aluminum end housing. Reflectors are steel, white enameled inside and gray outside, and may be easily removed for cleaning. Aluminum threaded covers provide easy access to the terminals, ballasts and lamps.

Chemical warehouse is a small, well-ventilated, isolated building used for the storage of hazardous chemicals. Power and lighting loads are supplied from a four-wire, 277/480 volts, three-phase, 60-cycle, y-grounded circuit. Using the single phase, 277 volts for the lighting eliminated the need for an explosion-proof 480/120 volt lighting system transformer. Fluorescent lighting fixtures are the same as those used in the chemical manufacturing building, except for the ballasts.

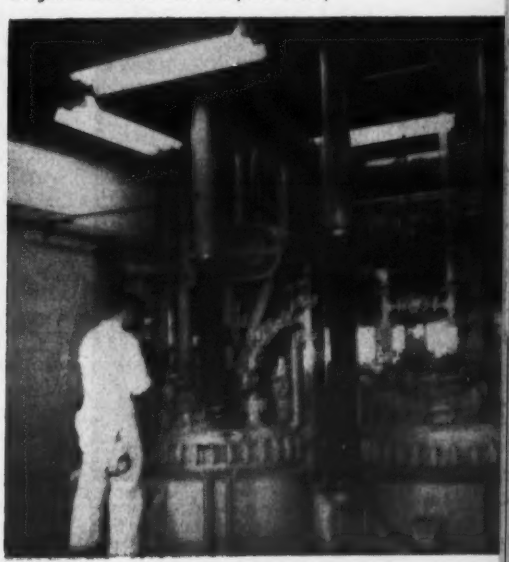
Results: Fluorescent lamps have a life of approximately 7500 hours, about 10 times that of incandescent lamps. Fluorescent lamps give more even light, are more economical, and furnish a higher lumen output per watt input.

(Type EFH explosion-proof fluorescent fixtures are product of Appleton Electric Company, 1701 Wellington Ave., Chicago 13, Ill.)

Check 2289 opposite last page.

Fluorescent fixtures in chemical warehouse operate on 277 volts, saving cost of installing a transformer

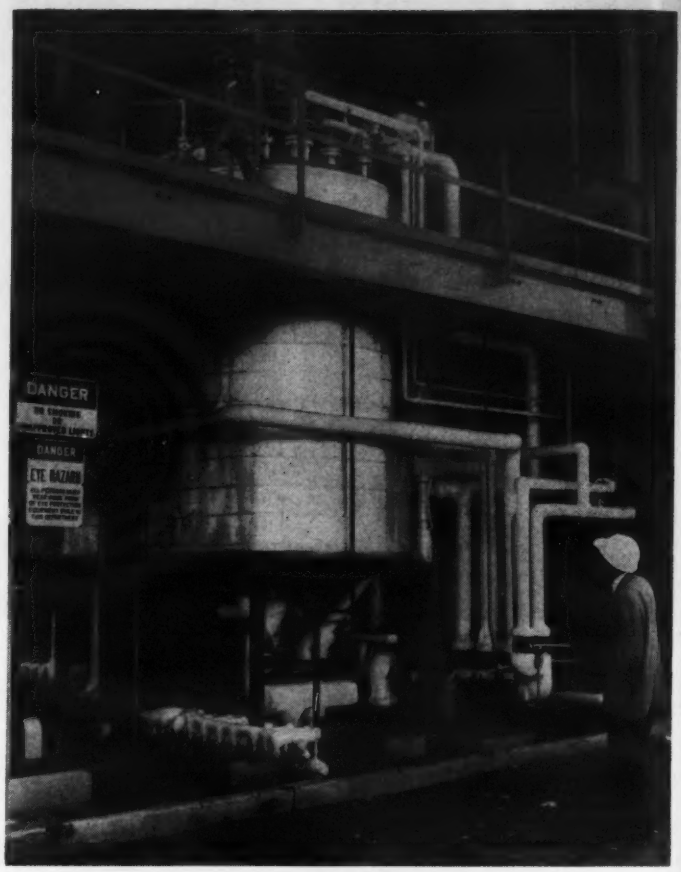
Fluorescent lighting fixtures help plant to handle Grignard reaction with complete safety



Purity of Polyols Protected by Stainless Reactor

Possibility of contamination prevented by pressure vessel which utilizes economical stay-bolt construction for jacket — has top-entering mixer that permits accurate temperature control and assures uniform reaction

GORDON WEYERMULLER, Associate Editor
with **FRED FLETCHER,** Ass't Supt., Oxide Products Plant
Wyandotte Chemicals Corporation, Wyandotte, Michigan

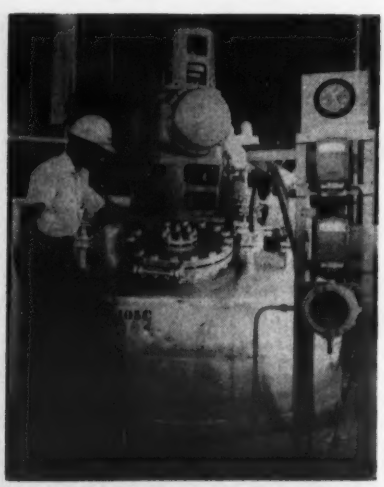


A. J. Karner, Senior Design Engineer, checks stainless reactor recently placed in service at Wyandotte Chemicals Corporation

Although stainless steel is usually used in chemical operations to control corrosion, this was not the case with Type 316L stainless reactor recently placed in service at Wyandotte Chemicals Corporation. Reason for selection of stainless here was to maintain purity of products being manufactured.

The 2500-gal reactor is used in a batch process to produce a series of polyols, including the Tetronic, Pluronic and Pluracol series. One principal use of these products is as nonionic surface active agents.

Reaction involves propylene oxide and ethylene oxide, which are not corrosive to iron. However, since vessel is washed out with water between batches, there is a possibility of rust forming at this time. Use of stainless prevents rusting. Also, possibility of contamination from material in a preceding batch is eliminated. Washing is made easier. All lines going out of vessel are also stainless.



Top-entering mixer permits accurate temperature control and uniformity of reaction from time liquid first enters bottom of vessel

Reactor Design

Reactor is designed for 200-300°F and 0-100 psi. Steam used is at 125 psi. Jacket of vessel is used for both heating and cooling. Although reaction is exothermic, heat is needed to get it started. Cooling water is required later to remove excess heat. Product leaving reactor is separated from catalyst and purified in further processing steps.

Vessel is constructed using the stay bolt method of fastening jacket to vessel wall. Stay bolts welded on outside of reactor before outer wall of jacket was installed are shown in one of photos. Stay-bolt construction substantially lowered the price of vessel since thinner metal could be used. Stay bolts strengthen vessel and permit it to be used under both vacuum and pressure without danger of collapsing walls. Stay bolts are designed so that the flow on jacket side is relatively uninterrupted.

Stay bolts being welded on outside of reactor prior to installation of jacket. A substantial saving in cost of vessel was provided by the stay-bolt construction

Welding

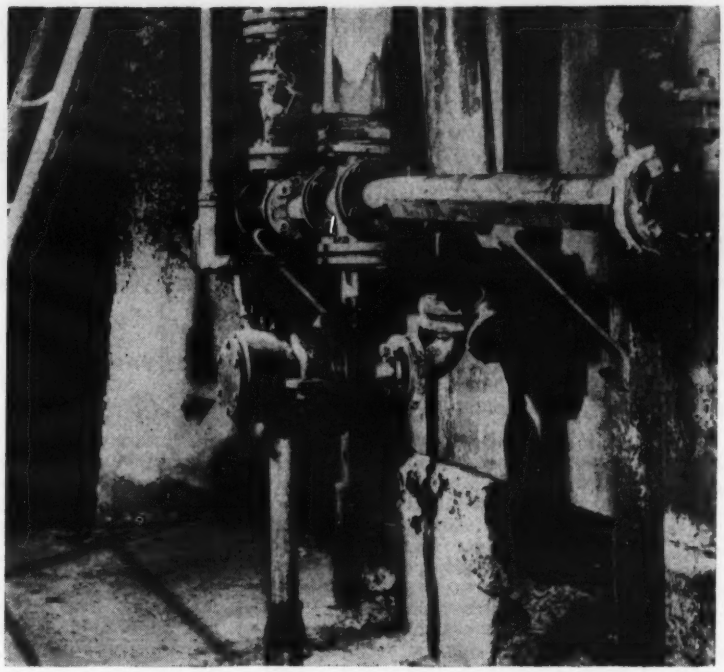
Experience with other vessels of this type at Wyandotte has indicated the high quality of the welds produced by present procedures. Hundreds of 1″ plug welds were made with Mig unit using CO_2 shielding. A constant voltage motor generator power unit, a simplified constant-speed wire-feeding device, proper welding grade CO_2, regulating equipment, and a manual gun with fingertip control were used. Result was control of spatter and weld bead, consistency of penetration, minimum need for reworking, and greatly enhanced appearance of welds.

Mixer

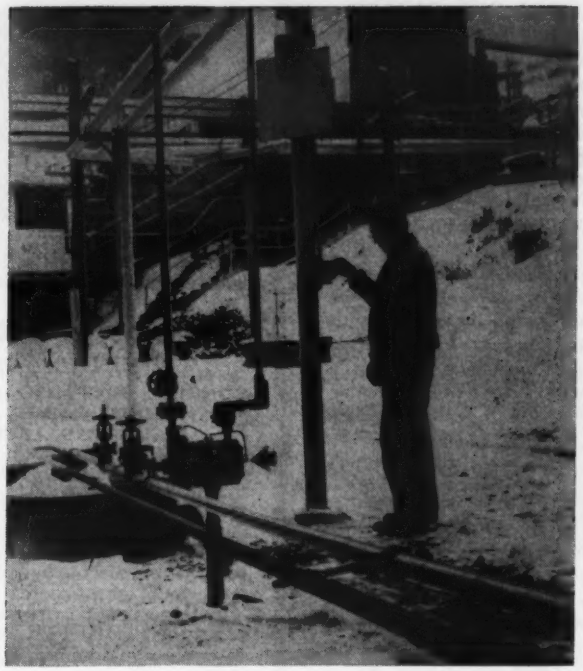
A top-entering mixer, as shown in photos, is used to permit accurate temperature control and make the reaction uniform. In addition to having

To page 36

Canned pump (arrow) made of Carpenter 20 alloy supplying 69% sulfuric acid to two 55-ton concentrator units. Note damage done to concrete by acid leaking from former pump. Previous pump required a 12 sq ft foundation



This totally enclosed pump (arrow) handles nitric acid from ammonia oxidation and recovery. Note simplicity of installation. This pump is made of 316 stainless steel



While nitric and sulfuric acids escaped from former large-size pumps, corroding flooring and structures and causing excessive maintenance —

Compact, Canned Centrifugal Pumps Handle Acids Without Leakage

E. L. **STEIGERWALT,** Acid Supervisor
Atlas Powder Company, Explosives Department
Reynolds, Pennsylvania
with **CP Staff**

Problem: Pumps used for handling acids at Atlas Powder Company leaked, causing excessive corrosion to flooring and structures. Leakage of the acid, both nitric and sulfuric, resulted in frequent and extensive maintenance, especially to piers and pump-motor bases. Besides requiring time-consuming shoring up, corrosion caused serious misalignment problems.

Leakage problem was cumulative in that packing would shrink and wear on contact with acid. Maintenance costs soared, with continual packing gland "nursing" until actual replacement became necessary.

Conventional low-speed pumps were first installed to minimize packing wear through low shaft rpm. Because of their slow speed, these pumps required higher horsepower ratings to deliver the required head and capacity. In addition to excessive power consumption, these large slow-speed units took up too much valuable space.

High operating expenses resulted from power costs and from the larger starting equipment required. In confined areas, large pump motors jutted into passageways and were a constant source of operating personnel complaints, such as acid burns and ruined clothing.

Solution: Plant installed totally enclosed centrifugal pumps which have no mechanical seals, stuffing boxes, or other shaft-sealing devices. No external lubrication is required for the high-speed units. Only moving part, the rotor-impeller, is lubricated by fluid being pumped.

Results: Pumps required no maintenance in the first 10-15 months in service. Leakage has been eliminated, corrosion of surrounding area stopped, and maintenance costs cut. A difficulty that arose recently was corrected by pump manufacturer.

Fact that pump takes up only a fraction of space of that needed for former units is an advantage. High speed of canned pump delivers required head and capacity at a considerable reduction in horsepower. For example, one pump uses a ¾-hp motor at 3450 rpm. Another uses a 1½-hp motor at 1750 rpm.

Pumps operate so quietly that an indicator light was installed on one pump to show when it was running. Misalignment problems have been eliminated with canned pumps.

(Canned pumps are product of Chempump Division, Fostoria Corporation, Huntingdon Valley, Pa.)

Check 2290 opposite last page.

Stainless Reactor

From page 34

an impeller in center of vessel, a smaller impeller is mounted on same shaft near bottom below bearing. This provides agitation while liquid is entering vessel.

Mixer parts are contained in three casings, machined for close-tolerance rabbet fit and rigidly joined for positive alignment. Mixer shaft is suspended in two adapter-type pre-lubricated bearings, with tapered bores for positive centering and true running.

Shaft passes through a hollow quill with full clearance. Quill is suspended in a separate set of bearings, which carry transmission loads only. Shaft and quill are connected by a Falk Steelflex coupling. This construction isolates the shaft from the gearing. It saves wear on gears and protects gears against damage in case of shaft flexures or shock loads. Quill is driven by a special bevel gear and pinion.

Speed is determined by the ratio of change gears. Gears are lubricated by an oil bath kept in constant circulation at all speeds. Wetted parts for mixer in this reactor are 316L stainless.

(Reactor was fabricated by Solar Chicago, Div. of U. S. Industries, Inc., 6400 W. 66th St., Chicago 38, Ill.)

Check 2291 opposite last page.

(Stainless plates, heads and other items used for fabricating reactor are product of G. O. Carlson, Inc., Thorndale, Pa.)

Check 2292 opposite last page.

(Series E mixer used in reactor is product of Mixing Equipment Co., Inc., 135 Mt. Read Blvd., Rochester 11, N. Y.)

Check 2293 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

Monsanto Task Force Chemicals...

Actamer, Santobrite, Santophen 1

CONQUER MICROORGANISMS FOR "GERMPROOF" PAINTS, COSMETICS, WALLBOARD, LAUNDRY

Today, "germproof" has become a magic selling word for companies that market products to a germ-conscious public. Monsanto supplies a line of compounds that destroy, disarm, or discourage microorganisms for "germproof," "odorfree," "spoilage-proof" products. Examples: SANTOBRITE, widely used to make non-spoiling, germ-discouraging wall paint, moldproof cellulosic insulation and wallboard; also used in solution form in laundry rinsing to prevent molding of wet-stored linens, a benefit that soon may be combined with bleaching and starching . . . SANTOPHEN 1, another low-toxicity-to-humans compound, combines surprising mildness to the skin with the highest potency for killing *staph* organisms . . . ACTAMER, soap and cosmetic bacteriostat, now finding new uses for controlling bacteria-caused odors in a variety of sun-tan cremes and feminine hygiene preparations; also attracting interest for use in paper to make "antiseptic" wrappings.

Sulfasan R

ECONOMICAL VULCANIZING AGENT GIVES RUBBER HIGHEST HEAT RESISTANCE—ENDS BLOOM

You can give your rubber products good heat resistance—at a reasonable cost—and eliminate unsightly bloom by partial replacement of conventional curing agents with SULFASAN R. This unique vulcanizing agent also provides greater safety from scorch and can boost modulus, reduce compression set and improve aging. In some compounds it trims the cost by reducing the total amount of vulcanizing agent required. As little as 0.8 to 2 parts of SULFASAN R per hundred of rubber, plus a small amount of THIURAD (tetramethylthiuram disulfide), is usually sufficient to achieve good results in GR-S, butyl, nitrile and natural rubbers. And SULFASAN R is non-discoloring; it can be used in white and light-colored stocks.

Vanillin

GIVES PAPER A BETTER SMELL FOR GREATER "SELL"

Paper makers and paper converters are finding that the faint, pleasing odor of vanillin helps them gain a better competitive position. Vanillin hides the natural boxboard or paper odor—imparts a light, fresh cookie-like fragrance. By offering the pleasant smell as an "extra" benefit—paper marketers are gaining business in bakery wrap and bags, in paper and paperboard for drug packaging, in candy wrap, and even boxboard for packaging kitchen utensils. Application is simple: a faint powdering or a mist-spray of vanillin solution in water gives paper or board a mild, pleasing aroma that is stable in odor character and long lasting.

Mission today: **A DISTINCT**

MONSANTO CAN PUT A TASK FORCE OF CHEMICAL "SALES-ADVANTAGE BUILDERS" AT YOUR COMMAND

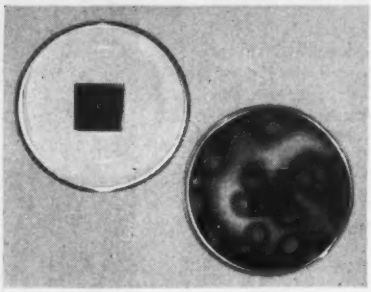
Want a Distinctive Difference That Sells . . . flame resistance? lower cost? "germ proofness"? a pleasant odor? better appearance? Whether your "consumer" is the American family or a special industrial market, most of your prospective buyers are looking for plus values and extra benefits like these. Here are some Monsanto materials that impart this type of competitive edge to a variety of products. Perhaps the sales advantages in these applications, or others that occur to you, can be developed in your particular product. Why not check into the possibilities right now while you're thinking about it. Write to: Monsanto Chemical Company, Task Force Chemicals, Dept. C, St. Louis 66, Missouri.

Orthonitrochlorobenzene

BASE FOR A VARIETY OF LOW-COST AROMATIC END PRODUCTS

Marketing advantage: good quality at the lowest price. For the diversified-organic-chemical maker, *o*-NITROCHLOROBENZENE can be one of the cheapest starting materials to a whole variety of substituted aromatics with specialized commercial uses that could represent significant markets. Its highly reactive chlorine is the key to creative synthesis. Ordinarily, an aromatic linked chlorine atom *will not react* in displacement-type reactions. In ONCB, however, the $-NO_2$ radical makes the chlorine in the ortho position highly reactive. Dozens of substituents can be readily fixed to the ring (with high yields) in place of the chlorine atom. The cost of the starting material in tank car quantities is so low that ONCB can be converted with a variety of low-cost reactants to make a large number of other substituted aromatics that serve dozens of specialized uses. This makes ONCB a prime starting point for custom specialty manufacturers.

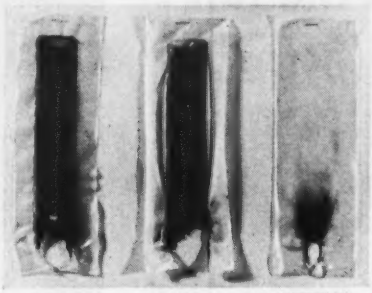
(*For a route map to over a hundred compounds, request a copy of ONCB derivatives chart.*)



p-Toluenesulfonamide

FREES PROTECTIVE COATINGS FROM MILDEW AND FUNGUS ATTACK

In varnish or paint films, *p*-TOLUENESULFONAMIDE imparts unusual protection to damaging attack by microorganisms. Although many compounds show fungicidal ability, most are inactivated by incorporation into varnish or paint. *p*-TOLUENESULFONAMIDE maintains its fungicidal power, even when blended—kills fungus as shown in test above. It is readily compatible with varnish vehicles, and as little as 2% makes the films mildew-proof. Two-year exposure tests in the jungle under hot, humid, tropical conditions showed that test ropes impregnated with a good spar varnish (phenolic resin and tung oil) containing *p*-TOLUENESULFONAMIDE were free of the damaging fungal attack that virtually destroyed the controls. A white crystalline powder, *p*-TOLUENESULFONAMIDE is free-flowing, inexpensive and nonirritating. One fast-growing application: electronic equipment coatings. Signal and electrical control equipment often fails in hot, humid environments due to fungal growth on the units. Varnish films containing *p*-TOLUENESULFONAMIDE give such electrical equipment complete protection.



Santicizer 141

MORE EFFICIENT PHOSPHATE-TYPE PLASTICIZER BOOSTS FLAME-RETARDANT VINYLS

To provide film, sheeting and coatings with the distinctive feature of flame resistance, most vinyl processors now select SANTICIZER 141. It improves light stability, tear resistance and low-temperature flexibility. Films using it may have as much as 50% more tear strength than films plasticized with straight DOP. And SANTICIZER 141 is a *low-cost, nontoxic* primary plasticizer. It has low volatility, good resistance to solvent and water extraction, excellent resin compatibility and practically no odor. For upholstery, tents, tarpaulins and covers, belting, tapes, rainwear, coatings, films and other vinyl products where flame retardance promotes sales, be sure you check out SANTICIZER 141.

SALES ADVANTAGE

Monsanto®

Watch Monsanto's science documentary, "CONQUEST," CBS/TV, Sun. Afternoon.

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- ☐ ACTAMER
- ☐ SANTOBRITE
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- ☐ VANILLIN
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- ☐ *p*-TOLUENESULFONAMIDE
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ACTAMER, SANTOBRITE, SANTOPHEN, SULFASAN, SANTICIZER: Monsanto T.M.'s, Reg. U. S. Pat. Off.

Check 2294 opposite last page.

PVC flexible sheet protects ceiling from SO_2 fumes

Problem: At American Maize Products Co., Roby, Indiana, an atmosphere of SO_2 fumes and 100% humidity corroded concrete ceiling. This occurred in room where starch is separated from gluten by means of centrifuges. Some of SO_2 used in the process is given off at this point.

New ceiling, poured against T-ribbed PVC sheet, is impervious to corrosive attack. Note effect of SO_2 fumes and 100% humidity on concrete beams below ceiling

Liquid-applied coatings were tried on ceiling without notable success, estimated annual maintenance costs running about $1.00/sq ft.

Solution: Gray PVC flexible sheet, called Amer-Plate T-Lock, was installed at about $2.50 per sq ft.

Sheet is molded with integral T-shaped ribs on the back spaced on 2½" centers, running the length of the sheet. Sheets were prefabricated at factory to exact bay size and placed on the form. Seam areas were heat-welded, insuring a continuous and homogeneous sheet.

A new ceiling was poured against the T side of sheet. When forms were stripped, sheet was held by T's embedded in concrete, forming a positive mechanical lock.

Results: Ceiling has now been in place about 3½ years and maintenance costs have dropped to zero. Plant has indicated that material may be used in other locations.

(Amer-Plate T-Lock is product of Amercoat Corporation, 4809 Firestone Blvd., South Gate, Calif.)

Check 2295 opposite last page.

ROCKWELL HYPREGUN

Assures positive valve lubrication

Records prove that Rockwell-Nordstrom *lubricated* valves shut-off tighter and stay in service longer at lower cost than non-lubricated valves. Performance and economy of these valves is greatly improved through proper, scheduled lubrication. The Rockwell Hypregun (above) is a compact, lightweight (39 lb.) pressure valve lubricator that allows fast, precise lubrication of large numbers of valves by even inexperienced maintenance personnel.

The Hypregun is a proven time and money saver for large scale valve lubrication in industrial-process installations. For smaller installations, there are also Rockwell booster guns and bucket pumps to assure the same economy and speed. Whatever your lubricated plug valve, lubricants or lubricating equipment needs, select from Rockwell-Nordstrom, the original and most complete line. Rockwell Manufacturing Co., Pittsburgh 8, Pa.

Canadian Valve Licensee: Peacock Brothers Limited.

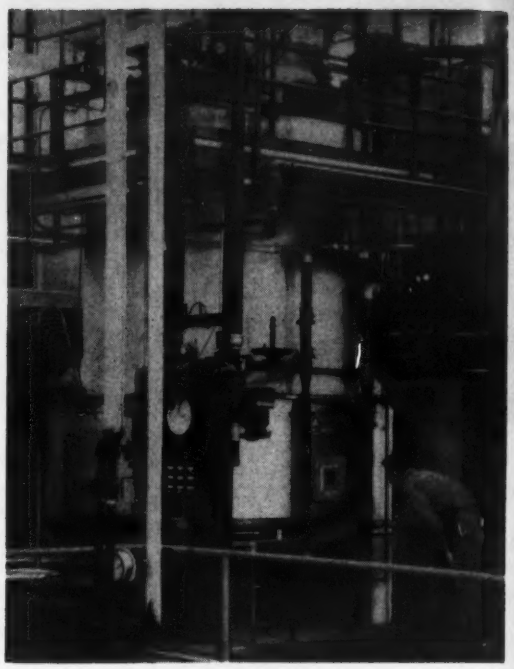
ROCKWELL · Nordstrom VALVES

another fine product by

ROCKWELL

Check 2296 opposite last page.

NEW SOLUTIONS
of processing problems



Jacketed reactor (top) is mounted on top of compact gas-fired furnace. Radiant heating eliminates hot spots in reactor

Installing an efficient gas-fired furnace for its new reactor, Kessler Chemical finds that radiant heat, coupled with ±2°F temperature control . . .

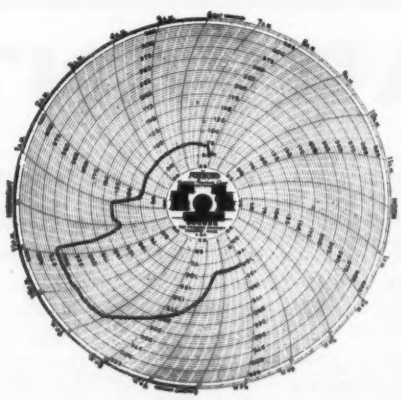
• Stops hot spots
• Ups ester quality

R. W. KERR, Plant Manager
Kessler Chemical Company, Inc.
with **CP STAFF**

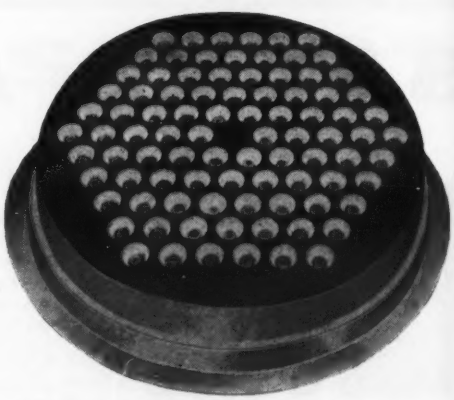
PROBLEM: Skyrocketing demand for its industrial esters forced Kessler Chemical Company to expand its production facilities. Among the key units needed in the process was a still-type reaction vessel. Reactor had to be efficiently heated with precise control to insure the output of a top-quality product.

Hot spots could not be permitted since some of the raw materials were heat sensitive. Located in Philadelphia, Pennsylvania, the plant produces "tailor made" esters and derivatives to exact specifications of pharmaceutical, cosmetic, and other manufacturers.

To insure optimum production results, engineers had to find answers to the following: How could heat be best applied



Temperature log for typical batch of esters. Note rapid heat-up, cooling-off time, and close control during two-hour holding period



Cluster arrangement of burners establishes uniform temperature on bottom of reactor

to the reactor at greatest flux without harming the heat sensitives? Could the heating cycle be accurately reproduced in successive batches? Could the entire operation be made "fail safe?"

In addition, the entire system had to be reasonably economic, capable of functioning with minimum maintenance, and could not occupy an excessive amount of space.

Solution: Equipment consisting of a large jacketed reactor mounted on top of a compact, gas-fired furnace was installed. Furnace operates on gradient heating principle. A cluster arrangement of two groups of burners establishes uniform temperature on bottom of reactor. Double manifolding permits all or portion of burners to be used as needed.

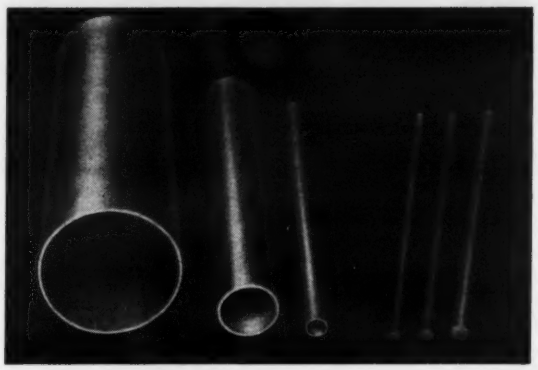
Radiant heat is created by burning a controlled gas-air mixture against the cup-shaped refractory surfaces of the burners. Cup surfaces beam radiant heat to bottom of vessel, located 10″ above burners. Combustion is completed entirely within each cup.

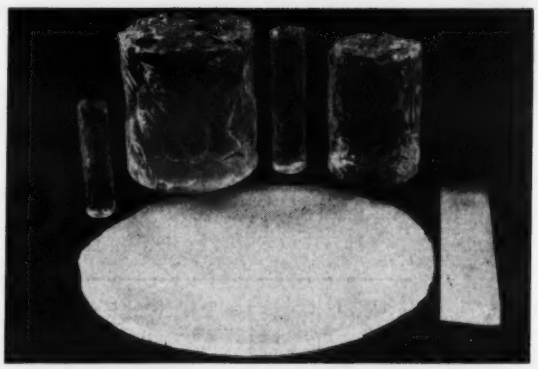
Burners provide maximum output of two million and minimum of 180,000 Btu/hr. Combustion and temperature control systems are designed to respond quickly and accurately to minute process changes.

A typical batch is processed as follows: Raw materials for the particular ester to be made are pumped into the reactor. A predetermined reaction temperature is set on the control instrument. Spark-ignited pilot is lighted (after a safe-start purge cycle) and burners are started.

It takes less than three hours to bring a big batch up to 464°F. Automatic controls, governed by a liquid bulb thermometer, reduce heat input as batch nears peak temperature. To insure that all reaction water is removed, batch is kept at 464°F for two hours.

This holding period is most important. Final quality of the ester depends largely on how





COMPARE THE PHYSICAL PROPERTIES OF G-E FUSED QUARTZ PRODUCTS WITH WHATEVER YOU'RE NOW USING

. . . and remember, you pay nothing extra for the high standards of purity in General Electric Fused Quartz Products

General Electric high purity Fused Quartzware for the laboratory has exceptional properties—chemical, electrical and mechanical. Because it's pure, it's dependable. When you specify or buy G-E Fused Quartz Products you get all your requirements from a single source, and you can choose from a complete line.

CHEMICAL PROPERTIES: Made by the fusion of very inactive natural crystals, G-E Fused Quartz is chemically inert with just about everything—except alkaline reagents and one or two acids. It's an amorphous material of completely vitreous structure and needs no added ceramic or binder.

ELECTRICAL PROPERTIES: Features high resistivity, low dielectric losses. Has less affinity for moisture than any other material—so, surface leakage is less than with glass, porcelain, etc.

MECHANICAL PROPERTIES: Compression strength is about 190,000 psi. Tensile strength is approximately 7,000 psi. Modulus of elasticity in compression estimated at 9,400,000 psi.

Hardness (Moh's scale)	4.9
Devitrification Point	Starts at about 1050°C
Density	2.2
Coefficient of thermal expansion	.55 x 10–6
Softening Point	1667°C
Melting Point	1756°C
Dielectric Constant	4.1

THESE ITEMS ARE READY FOR IMMEDIATE DELIVERY:
STANDARD TAPER JOINTS • BALL AND SOCKET JOINTS
GRADED SEALS—QUARTZ TO PYREX • CRUCIBLES • BEAKERS • FLASKS
TEST TUBES • EVAPORATING DISHES

FOR THE WHOLE STORY on this exciting material, write: General Electric Co., Lamp Glass Dept. CP-129, Willoughby Quartz Plant, Willoughby, Ohio. Ask for the free publication, "G-E Fused Quartz".

Progress Is Our Most Important Product

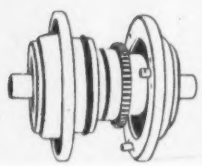
GENERAL ELECTRIC

Check 2297 opposite last page.

None better *at any price*

FAST, EASY ASSEMBLY AND DISASSEMBLY! Allen head, spiral cam fasteners which open and close with only a quarter turn are a permanent part of the cover . . . no loose nuts or bolts to get lost!

OFF - THE - SHELF AVAILABILITY! Link - Belt's full coverage of ground - finished bores from ½" to 2½" assures immediate delivery from stock . . . eliminates time and cost of reboring.



EASY OPENING ASSURES EASY SERVICING! It takes only seconds to see if relubrication is needed or if equipment needs to be realigned. Trouble can be detected in advance, shutdowns avoided.

NO NEED FOR LARGE INVENTORY! Components are separately cartoned . . . a few cover and sleeve assemblies plus the required assortment of hubs with finished bores will cover all requirements.

NEW CORROSIVE-DUTY COVER! Provides positive protection against damaging effects of corrosive attack. Construction includes stainless steel fasteners and polyester fiber seals.

LINK-BELT MOTOR COUPLINGS are priced low among high-quality flexible couplings

You're further ahead in every way with Link-Belt Motor Couplings . . . the most economical, best performing partners for motor-driven pumps, compressors, speed reducers, generators and similar equipment.

And low price is only the first saving! You save more in installation and maintenance. Quick-acting spiral cam fasteners assure fast, easy assembly . . . permit servicing in a fraction of the time required with couplings using bolts.

High capacity and durability are embodied in the geared design. Torque transmitting parts are fully and accurately machined from cold-rolled steel. Especially important, compensation for both angular and parallel misalignment is FREE—i.e., without imposing loads on shafts and bearings.

Folder 2875 has complete details. Contact your nearest Link-Belt office or authorized stock - carrying distributor.

LINK-BELT

GEARED FLEXIBLE COUPLINGS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World. 15,152

Check 2298 opposite last page.

precisely the temperature can be controlled.

Fast Cooling

After two hours have elapsed, burners are shut off and product is cooled as quickly as possible to 257°F. This is done by circulating cold water through reactor's cooling coil. Rapid dissipation of heat from furnace's burners helps considerably in dropping temperature of batch. Vacuum (about 10 mm) is also applied to reactor to minimize product oxidation and color degradation.

Excess reactants are removed by bringing temperature quickly back up to 275°F (under vacuum) and holding it there for one-half hour. Burners are then turned off, batch is cooled to 167°F, and product removed for blending and final analysis. After laboratory approval, material is packaged for shipping.

Solid esters are generally flaked and packaged in fiber containers. Liquid products are shipped in 55 gal drums. Some esters are packaged in containers having special food liners.

Results: The plant has essentially doubled its production capacity of tailored esters. The new equipment operates to the complete satisfaction of company personnel and has resulted in some cases in product quality improvement. There are no hot spots and there is no charring or heat degradation of final product.

Quality improvement is largely due to better control and distribution of heat. Temperatures are maintained at both high and low levels with variations of not more than plus or minus two degrees.

The system is also equipped with an over-ride safety control to prevent overheating. Desired temperature cut-off is preset on separate instrument at start of cycle. If main system should fail to control established processing temperature, safety control automatically shuts off furnace when reactor temperature reaches preset cut-off point.

To bottom of page 43

Tractor shovel replaces five-man crew previously needed to unload tightly packed gypsum from railroad cars

Gypsum + Water = Plaster

. . . and plaster is almost the condition gypsum will become in humid weather around Ideal Cement Co., Baton Rouge, La. By replacing a five-man crew with a shovel tractor, this company . . .

Cuts Gypsum Unloading from 40 to 1 Manhour

WARREN FOGELBERG, Plant Manager
Ideal Cement Company, Baton Rouge, La.

Tractor with 18-cu-ft bucket is small enough to maneuver freely in boxcar and to do a complete job of unloading

PROBLEM: Gypsum arriving at Ideal Cement Co., Baton Rouge, La., would be packed so tightly that five employees might spend eight hours unloading a single car. The material was shipped in bottom-dump hopper cars.

Victim of Louisiana's highly humid weather, material would not be free-flowing for proper unloading by dumping. About eight carloads are received each week. Thus, unloading tied up men needed on important jobs around the plant.

Solution: In summer 1955, Ideal Cement discontinued use of bottom-dump hopper cars and purchased a rubber-tired tractor shovel to unload material shipped in boxcars.

Tractor has carrying capacity of 2000 lb. Maximum dumping clearance under the 18-cu-ft bucket, completely open, is 5′ 2½″. Carry height of bucket in 40° position is 5″.

To page 43

RIGID Thread Cutting Oils are available in convenient (4 ounce Nu-Clear only), 1 quart, 1 gallon, (2 gallon Nu-Clear only), 5 gallon, 30 gallon and 55 gallon containers.

Tests prove RIGID® Thread Cutting Oil gives you better threads faster... lengthens die life, too!

Recently a distributor in Atlanta, Georgia investigated a complaint of "bad pipe". Test threads were made in all sizes. Torn threads resulted. Then RIGID Nu-Clear Thread Cutting Oil was substituted for the oil being used. Perfect threads were obtained every time.

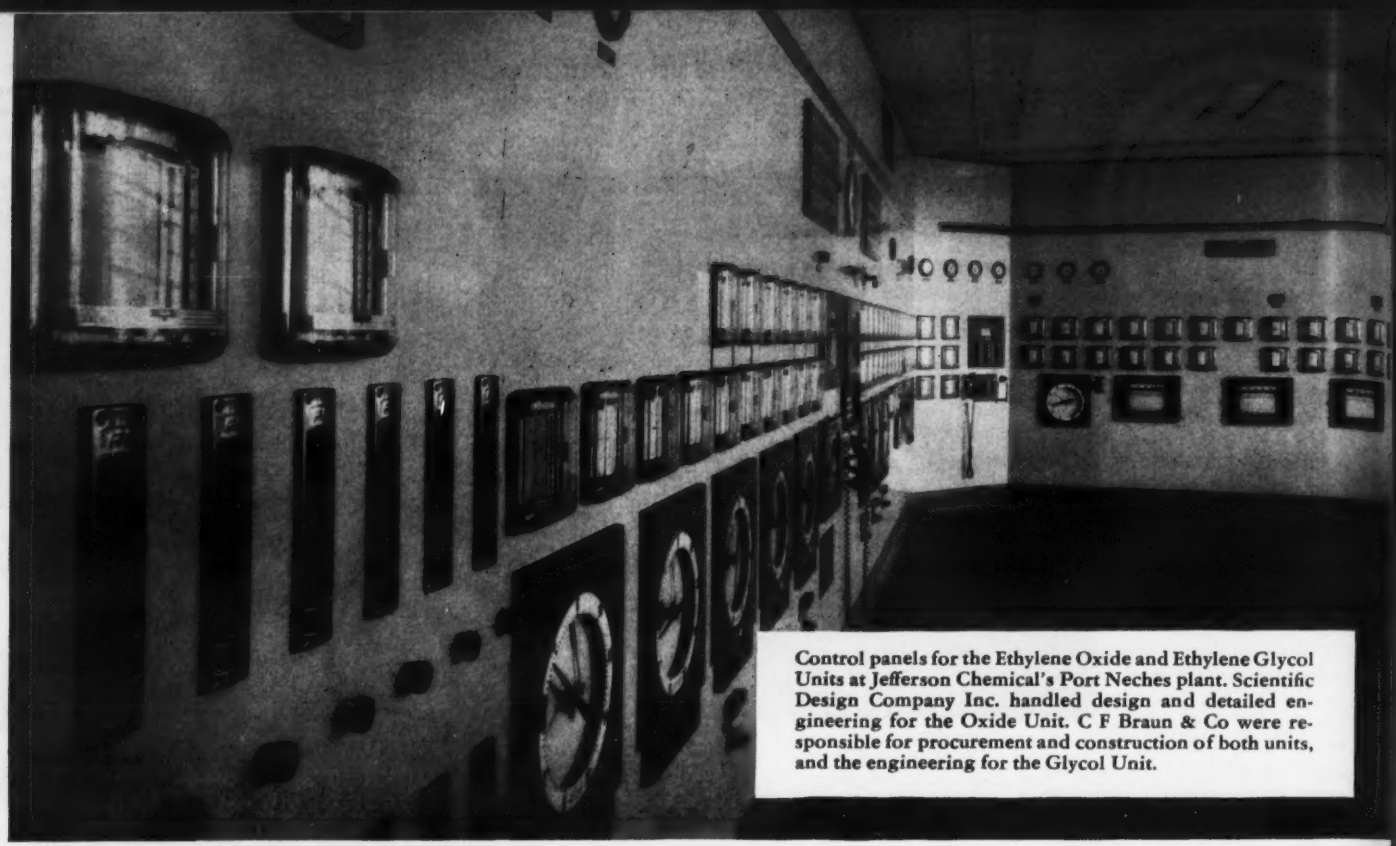
Here, then, is dramatic proof that you need a special purpose thread cutting oil . . . an oil that *cools, speeds metal removal, produces a smooth finish,* and *prevents chips from welding to your dies.*

No oil—in its pure state—will perform all these functions. That's why RIGID Thread Cutting Oils are an exclusive, exactly formulated combination of oils, blended for easier, faster threading . . . longer die life. What's more, these special-purpose RIGID oils are completely antiseptic . . . no danger of irritation or infection.

Make sure of good threads every time. Order RIGID Thread Cutting Oil from your Supply House today. Tops for *all* metal cutting . . . you'll want an extra supply for your lathe, drill press and other metal cutting equipment.

RIGID
The Ridge Tool Company • Elyria, Ohio, U.S.A.

Check 2299 opposite last page.



Control panels for the Ethylene Oxide and Ethylene Glycol Units at Jefferson Chemical's Port Neches plant. Scientific Design Company Inc. handled design and detailed engineering for the Oxide Unit. C F Braun & Co were responsible for procurement and construction of both units, and the engineering for the Glycol Unit.

JEFFERSON CHEMICAL RE-ORDERED

Part of the hexagonal control room for Jefferson's Ethylene Unit A-2, where refinery gases are cracked to yield high purity ethylene and propylene. Designed and built by Stone & Webster Engineering Corporation, this unit tripled Jefferson's ethylene capacity. Process control by Taylor Instrument Companies.

HERE'S WHY:

"Smoothest unit start-ups ever experienced"

"A very minimum amount of
instrument trouble was experienced"

"Instrument maintenance is at an all-time low"

"Transcope line of instruments
is as versatile as we have ever used"

"Dollar for Dollar value, Transcope instruments
are one of the most advanced designs offered today"

TAYLOR TRANSCOPE* INSTRUMENTS

The statements above, and many other equally complimentary comments, were made by the Instrument Engineer at Jefferson Chemical Co., Inc., Mr. J. W. Rutledge. He's referring to the performance of TRANSCOPE instrumentation at the Port Neches plant, first on the Ethylene Unit A-2 and later on the Ethylene Oxide and Ethylene Glycol Units.

In Mr. Rutledge's own words: "The new Taylor TRANSCOPE instruments were purchased for subsequent expansion, due to the fine performance of these instruments on our previous unit start-ups and the smooth operation of the operating units, as well as the low initial cost".

The photographs at left show a few of the several hundred TRANSCOPE Plug-in Recorders in use at Port Neches. In addition, Jefferson Chemical use many TRANSCOPE Indicators and Controllers and TRANSAIRE* Temperature Transmitters.

"Never before so many features in so little panel space", has been our claim for the 90J Transcope Recorder since first introduced. The experience of Jefferson Chemical, and of many other companies in the chemical, petroleum and petro-chemical field all over the world is, we believe, eloquent "proof of the pudding".

To learn more about the truly remarkable—and many unique—features of the TRANSCOPE instruments, call your Taylor Field Engineer; or write for **Bulletin 98286.** Taylor Instrument Companies, Rochester, N. Y., or Toronto, Ont.

*Reg. U.S. Pat. Off.

Taylor Instruments **MEAN ACCURACY FIRST**

Check 2300 opposite last page.

Gypsum Unloading

From page 41

Part of tractor's unloading job is to lower and raise heavy iron grating ramp from dock to car. Driver attaches cable from ramp to tractor's bucket and easily moves ramp by raising and lowering the bucket.

Receiving pit below boxcar extends several feet from either side of car. Wooden backstops at each end of pit make sure all material is directed into pit.

Working from loading dock, tractor starts its unloading job by dumping material through ramp. When enough material is removed to permit operation inside car, driver makes use of both side openings and works entirely from inside the car. Tractor is small enough to maneuver freely inside car and to do a complete job of unloading.

Results: Tractor unloads car in about 1 hr 15 minutes regardless of gypsum's moisture content or compaction. Unloading costs have been cut considerably—manhours reduced from 40 to little over one for each car load.

The tractor itself is not a one-job machine—cleanup chores and other loading and transporting jobs keep it in continuous, profitable use.

(Model HA Payloader is manufactured by the Frank G. Hough Co., Libertyville, Ill.)

Check 2301 opposite last page.

Gas-fired Furnace

From page 40

Simultaneously, an alarm sounds until condition is corrected.

Furnace combustion system is monitored by Wheelco Flameotrol device. Should pilot flame go out, entire combustion system will automatically shut down.

(Selas furnaces and Duradiant burners were manufactured by the Selas Corporation of America, Dresher, Pa.)

Check 2302 opposite last page.

UNIQUE STARCH PROPERTIES

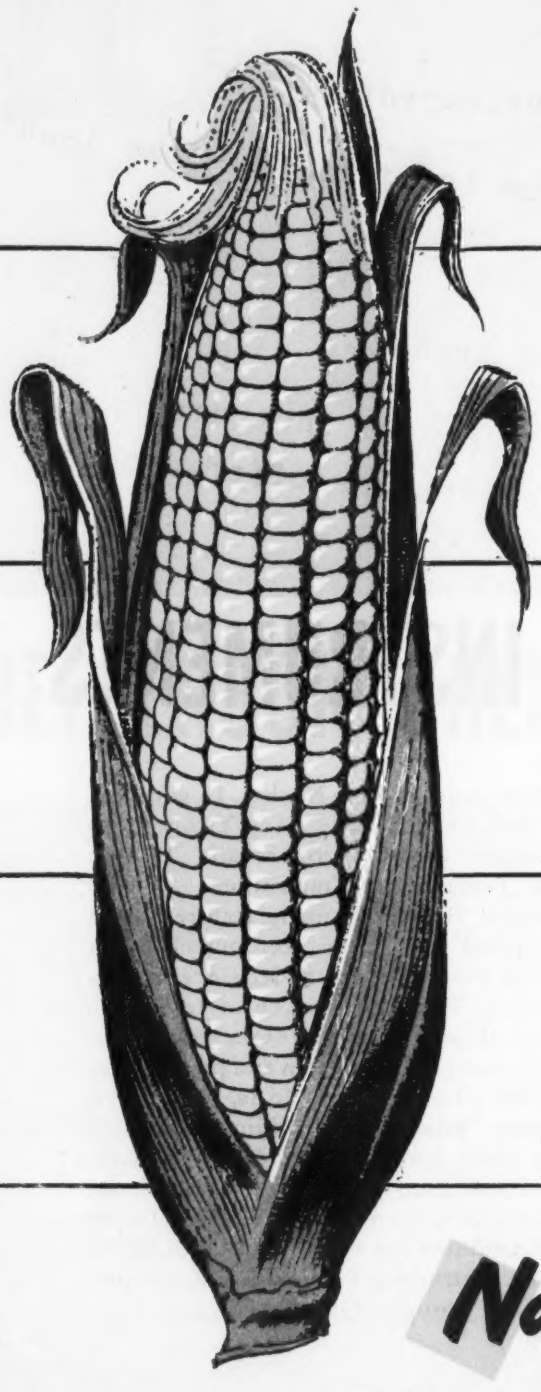
FROM GENETICS AND DERIVATIZATION

☐ **KOFILMS**—a series of low substituted corn starch acetates covering a wide range in viscosity. Designed for excellent film forming with maximum stability.
USES: Sizes, binders.

☐ **AMYLON**—first high amylose corn starch ever produced in semi-commercial quantities. Contains 57% amylose (ordinary corn starch has only 28%). Potentially offers stronger gels and tougher, more flexible films than possible with conventional starches.

☐ **NU-FILMS**—a series of hydrophilic starch derivatives which are polyelectrolytes. Dispersions offer excellent stability. A range of viscosities is available. USES: Sizing, thickener, finger paints, lotions, leather pasting.

☐ **KOSOL**—a cold water swelling amylopectin starch with excellent solution stability and surface filming. Clarity, stability and resistance to low temperatures are unusual. USES: Thickeners and stabilizers for foods, textile finishes, adhesives, sizes, paints, laundries.



☐ **ANOX STARCH**—a newly developed starch derivative that exhibits unusual clarity and filming properties. It offers excellent stability as well as low viscosity.
USES: Sizes, adhesives.

☐ **DRY-FLO**—a hydrophobic starch powder that flows like a liquid. It is water repellent, yet absorbs water vapor without losing mobility. USES: Dusting powder, fluidifying agent, lubricating agent, detackifier, emulsifier, water repellent film.

☐ **CATIONIC STARCHES**—starches that carry a cationic charge as an integral part of their polymeric structure. Unusual properties include a strong affinity for negatively charged surfaces. USES: Size, binder, flocculant, stabilizer, thickener.

☑ **CHECK THE STARCHES** you'd like to know more about for use in:

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National STARCHES

NATIONAL STARCH and CHEMICAL CORPORATION
750 Third Avenue, New York 17
3641 So. Washtenaw Avenue, Chicago 32
735 Battery Street, San Francisco 11

Check 2303 opposite last page.

NEW SOLUTIONS

Housekeeping innovations with existing equipment eliminate pollution

Problem: Midwest manufacturer was confronted with task of cleaning up industrial waste waters to prevent stream pollution. Anticipated capital outlay for water-treating equipment was estimated at between $50,000 and $75,000.

Waste water consisted of such contaminants as soluble and lubricating oils, waste pickle liquor and rinse water, and cyaniding quench water, each of which would require individual handling.

Solution: Survey to ascertain needs disclosed that use of existing plant equipment combined with a few good-housekeeping innovations would be adequate to purify waste waters and meet local anti-pollution regulations.

Drip receivers were installed to collect oily wastes which previously had been allowed to pass through floor drains into plant sewers. Wastes were dumped on coal stockpile. Spray pond was equipped with skim baffle to permit collection of floating oil for disposal on coal stockpile. Similar arrangements were made for waste soluble oils. Earthen basin was shaped at sewer outfall to trap oil accidentally spilled.

Waste liquors from pickle tanks were neutralized and precipitated sludge channeled into nearby lagoon. Rinse water was diverted into two underground oil-storage tanks.

Acid drag-out was neutralized by introducing alkali into rinse water as it passed to the tanks. Precipitated iron hydroxide settled in one tank; and clear, neutralized rinse water was drawn off through swing pipe and discharged into sewage system. Sludge then passed to second tank where it was concentrated and stored before going to lagoon.

Contamination of main body of waste water was corrected by switching to batch-rinse procedure for metal parts treated in cyanide salt baths. Previously, the parts had been

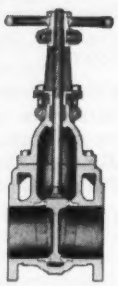
To page 46

PROCESS PIPING POINTERS

Square corner lap makes stronger flanged pipe joint

Square corner lap in this pipe joint provides a much heavier metal section at the turn, or fillet, than the round type . . . assures a smooth joint on inside of the pipe. Lap is completely machined overall . . . gives even bearing through joint for uniform gasket pressure. Flange swivels on pipe, facilitating alignment. Made of lap-welded steel or wrought iron pipe (in all weights), or seamless steel. Available in 150- to 1500-pound pressure classes. For more information, see below. Mention Cranelap joints.

Low-cost remedy for corrosion of iron valves



Where cast iron valves are practical but for corrosive and contaminating effects, 3% nickel alloy iron gate valves offer a low-cost remedy. These valves have the same strength but with substantially greater corrosion resistance. Priced slightly above ordinary iron, these valves in 2- to 18-inch sizes are attractive values for many chemical processing fluids. Companion swing checks available. Ask for Bulletin AD-2313—see below.

Seats last longer in stainless steel globe valves

This improved swivel disc seating design prevents galling and seizing on the seating surfaces. The disc stops rotating on contact with seat, and stem takes over all closing torque. There's more you should know about these longer lasting, maintenance-saving valves. See the Crane ad on the following page.

For literature or data on products listed above, please contact J. E. Bradbury, Manager, Chemical Sales Dept. No obligation.

CRANE CO.

Gen'l Offices: 836 S. Michigan Ave., Chicago 5

VALVES • FITTINGS • PIPE

PLUMBING • HEATING • AIR CONDITIONING

Branches and Wholesalers Everywhere

Check 2304 opposite last page.

CUT HERE AND FILE

Nomograph for Sizing Catalyst Hoppers

MRS. PETER D. SHROFF

6963 San Palo Circle, Buena Park, California

An aid in the sizing of catalyst hoppers, accompanying nomograph is based on equation:

$$T = \frac{\pi D^2 \rho}{8000} \left(L + \frac{D}{6} \cot \alpha \right)$$

where: T = capacity of hopper, tons
D = diameter of hopper, ft
L = length of hopper (tang. to tang.), ft
α = angle of sloping sides of conical bottom (30°)
ρ = density of catalyst, lb/cu ft

Formula does not include volume in spherical head, since this is available for outage space.

This nomograph essentially solves two types of problems:

1) To size hopper which is to hold a volume of catalyst of known density.
2) To find volume, of catalyst of known density, which can be stored in an existing hopper whose length and diameter are known. (Key given with nomograph is for this type of problem.)

Typical Examples

Index line (1) shows that 755 tons of catalyst with density of 40 lb/cu ft would require a hopper 25′ in diameter and 70′ long. It may be seen that various solutions could be found. For instance, another alternate would be a hopper 27′ in diam., 58.5′ long.

Index line (2) shows that capacity of a hopper 40′ long and 15′ in diameter is 117.5 tons for a 30 lb/cu ft density catalyst.

NOTE: Use ρ_1 scale with T_1 scale.

nomograph on page 47

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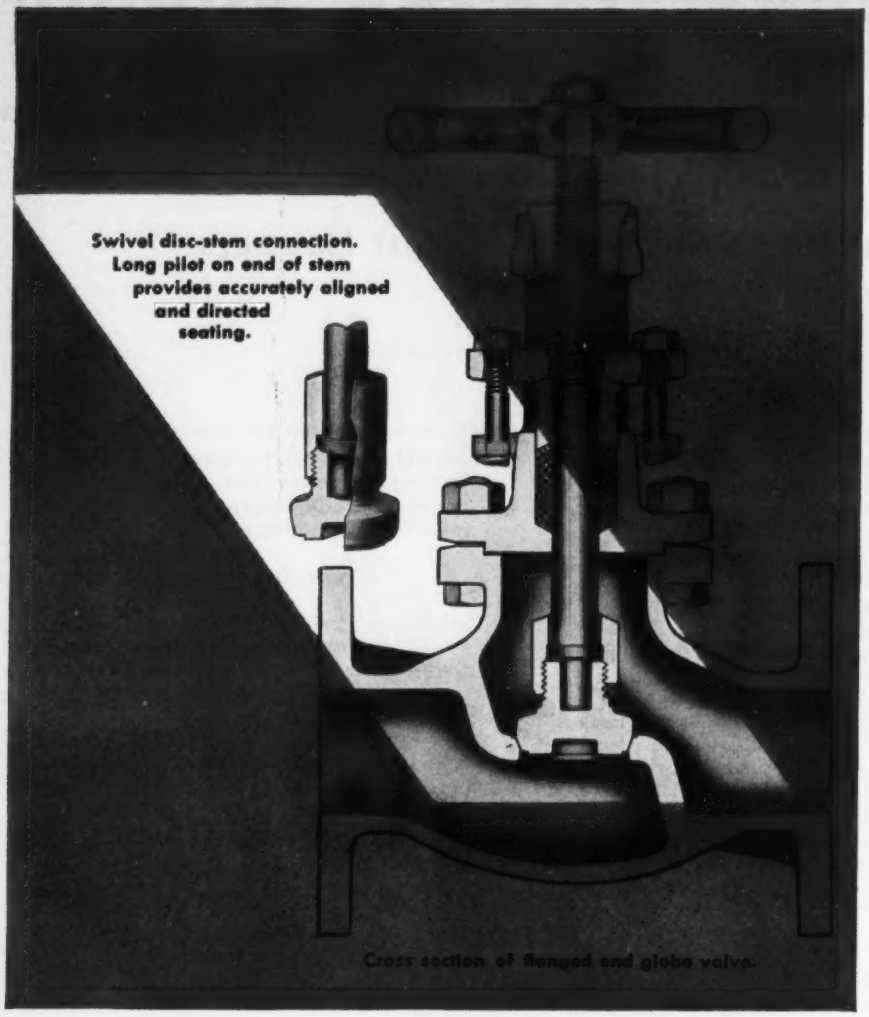
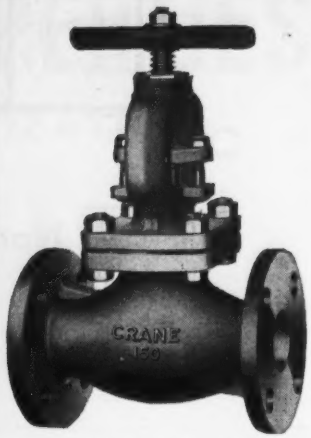
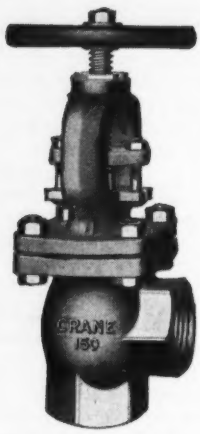


Cross section of flanged end globe valve.



No. 18811 globe, ½"-6", flanged ends; ½"-2", screwed ends.



No. 18812 angle. ½"-2", screwed ends; ½"- 6", flanged ends.

How this swivel disc saves seating surfaces in Crane 18-8 SMo Globes

Even on toughest corrosive fluids, you will find these valves seating tight long after others have leaked.

The seats last longer because the Crane free swivel disc-stem connection prevents seizing and galling on the seats. The disc stops turning on contact with body seat ring, and the stem takes over all the closing torque.

Minimum clearance in disc-stem assembly prevents vibration and chatter, and the long pilot end of stem guides the disc squarely to seat.

Another feature of this disc—its modified plug type design combines the easier seating of a narrow ball-to-flat seat, and the greater resistance to erosion and scoring of a wide plug type disc. It's the ideal design for throttling

Improved seating is but one of many refinements that make Crane 18-8 SMo globe and angle valves today's outstanding value in original cost as well as in maintenance savings.

For complete specifications and recommendations on applications for these all-stainless steel valves, consult your local Crane Representative . . . or write to address below.

CRANE® VALVES & FITTINGS
PIPE • PLUMBING • HEATING • AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Illinois—Branches and Wholesalers Serving All Areas

Check 2305 opposite last page.

NEW SOLUTIONS

From page 44

quenched in continuous stream of water. This measure reduced total cyanide waste to about 30 gallons per month.

Substitution of sodium hexametaphosphate for sodium dichromate used in some cooling water circuits to control corrosion remedied that source of contamination.

Results: Innovations purified waste water sufficiently to meet local anti-pollution regulations. Cost of effecting housekeeping innovations amounted to $5000 in contrast to $50,000 to $75,000 which would have been needed had water-treatment equipment been purchased. Survey by water consultation engineer cost even less than $5000.

(Water-treating consultation is service of Hall Laboratories, Hagan Building, 324 Fourth Ave., Pittsburgh 30, Pennsylvania.)

Check 2306 opposite last page.

Slippery-floor dangers are sprayed away by jet stream

Problem: Maintenance of plant cleanliness was considered important factor in helping to prevent accidents due to slippery floors at Gulf Oil Corp.'s Port Arthur refinery.

Solution: Two jet-type cleaning units were installed several years ago to aid in maintaining high degree of floor cleanliness. A total of 14 are now in operation. High-pressure hot water is mixed with detergent to accomplish cleaning.

Wheel-mounted units are located at stations with piped connections for water and inlet steam. Some 200′ of ¾" Neoprene hose on stationary reel permits cleaning within this radius around unit.

Hydraulic jets operate on ordinary steam and cold water. Venturi-injector design boosts discharge pressure. This provides necessary wallop for hydraulic scrubbing action. Also, it results in high

To page 48

DRAVER FEEDERS

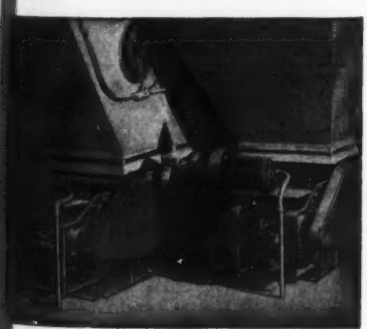
with or without automatic timing controls

Here's the way to keep production units—grinders, sifters, mixers, etc.—operating steadily at most efficient capacity. A Draver capacity regulating Feeder assures a continuous, uniform flow of material to the machine . . . prevents dangerous overloading and wasteful underloading . . . helps maintain quality control . . . repays its cost many times over in a smoother running production system.

Even sticky, hard-to-handle materials can be accurately regulated by dependable Draver Feeders—at rates from ounces to thousands of pounds an hour. Timing controls are available for feeding preset amounts at automatic intervals to continuous or batch processes.

What is *your* bulk feeding problem? Send details, and our engineers will be glad to make recommendations on a Draver Feeder that will save you production time and money. No obligation, of course.

Draver "Micro-Master" Feeders, mounted at floor level, feed to mixing equipment below.



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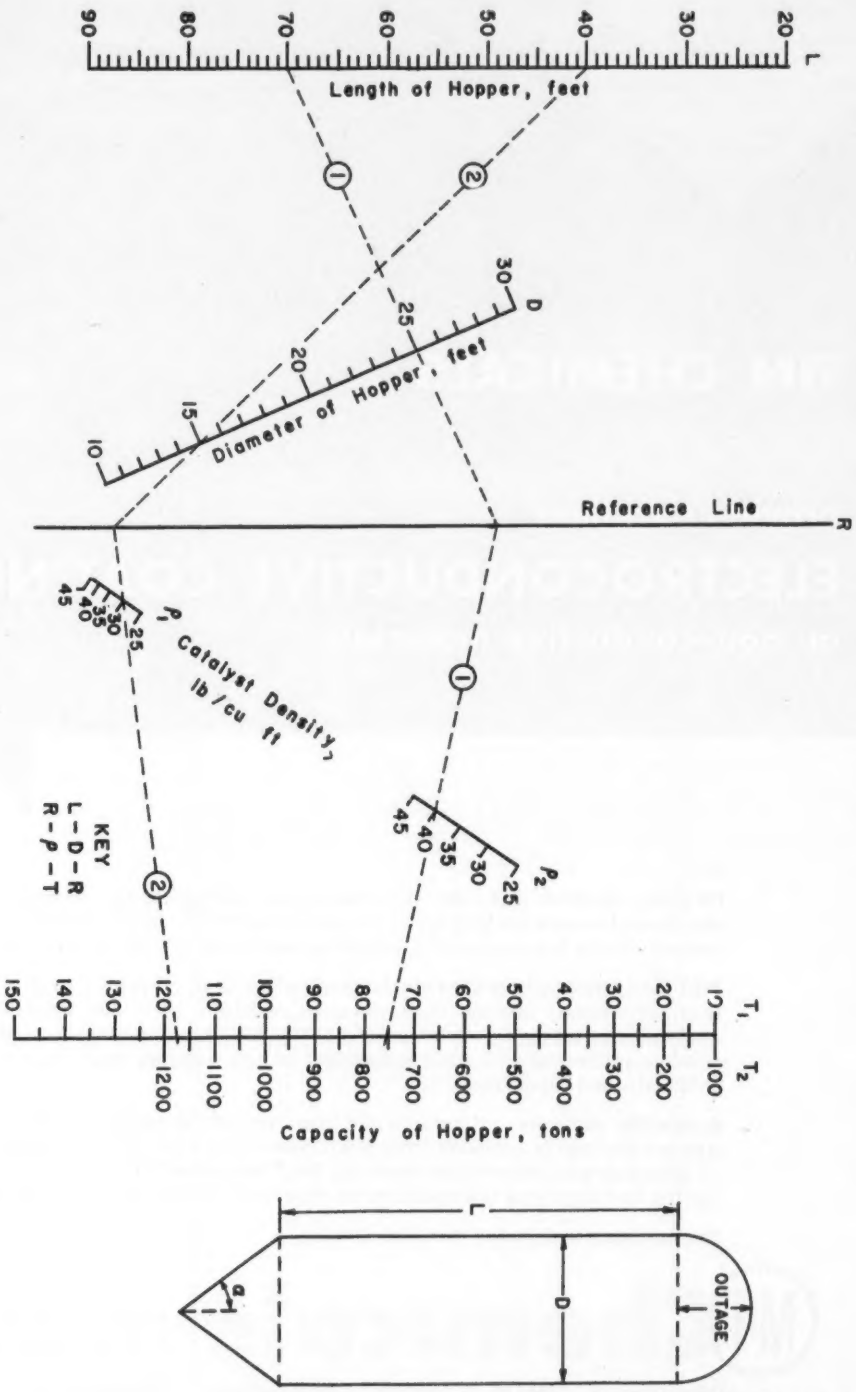
Check 2307 opposite last page.

CUT HERE AND FILE

Nomograph for Sizing Catalyst Hoppers

From page 45



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electroluminescence

non-fog windows

heating elements

conductive glass

decorative finishes

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provide excellent

ELECTROCONDUCTIVE COATINGS

on non-conductive materials

On glass, ceramics, and other non-conductors, coatings of tin chemicals provide electroconductance for heating or phosphor-excitation—or controlled conductance characteristics for electronic applications such as grid leaks and rectifiers.

M&T Tin chemicals have been outstandingly effective in preparing conductive films that are strongly bonded, hard, abrasion resistant, inert and insoluble. Their transparency makes them particularly useful in electroluminescence and treated-window applications. Coating techniques include dipping, spraying onto heated substrate, and vapor deposition.

A valuable summary of patents and literature on tin compounds in electroconductive coatings is available from M&T. Send for a copy. As the leading supplier of inorganic and organic tin chemicals, M&T can also offer substantial help in selecting and supplying the optimum tin chemicals for your development purposes.

See our insert in Chemical Materials Catalog

M&T Chemicals

Department P, **METAL & THERMIT Corporation,** Rahway, N. J.

Sn Sb P Si Ti Zr organometallics and inorganics

Check 2308 opposite last page.

NEW SOLUTIONS

From page 46

stream velocity (estimated at two miles/min).

Contributing to effectiveness of cleaning are stream temperature of 140°F and addition of detergent. Detergent is drawn from 55-gal storage drum in pre-set proportions through syphoning action of cleaning unit.

Results: According to Gulf, the hydraulic jet cleaners

Hydraulic jet cleaning units are located at stations with piped connections for water and inlet steam

have become important maintenance tools, which are used to clean cement floors (keeping them from becoming slippery), pumps and other equipment. Example: On heat-exchanger bundles, jet-cleaning stream ricochets through tubes. This action cleans even inner tubes.

(Hydraulic jet cleaner units are product of Sellers Injector Corporation, 166 Hamilton St., Philadelphia 30, Pa.)

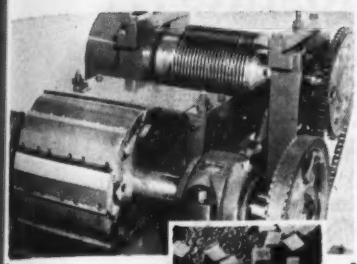
Check 2309 opposite last page.

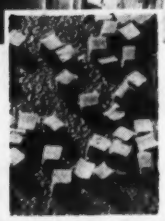
WANTED: NOMOGRAPHS — WORTH $20 EACH!

Do you have a pet nomograph that could save time for other **CHEMICAL PROCESSING** readers? If so, send it neatly and accurately drawn, with a double spaced, typewritten description to:

Data Editor
CHEMICAL PROCESSING
111 E. Delaware Place
Chicago 11, Illinois

We will pay $20 for each one accepted and published.





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Use Taylor-Stiles Pelletizers as do leading manufacturers of all of the above materials and of many others.

When they use Taylor-Stiles Pelletizers, they find that, in many cases

1. Production is greater
2. Power costs are lower
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For complete details on the full line of Taylor-Stiles Pelletizers, write today for our technical bulletins, #213, #216 & #217.

TAYLOR, STILES & CO.

20 Bridge Street, Riegelsville, N.J.

Check 2310 opposite last page.

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Volumes of Standard Dished Heads at Various Depths

J. F. KUONG

Atlas Powder Company
Wilmington, Delaware

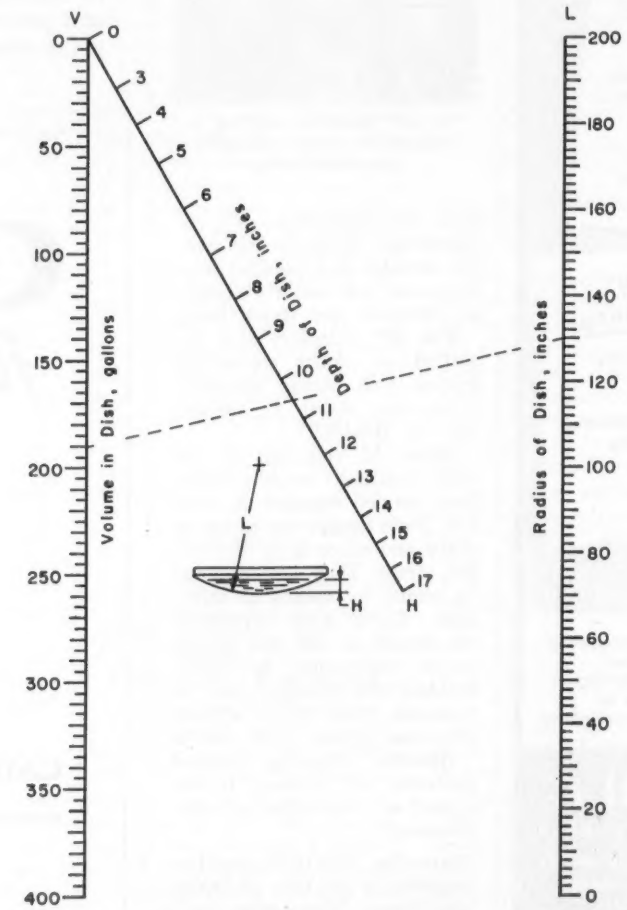
In estimating volumes of product heels for purposes of inventory, the chemical engineer needs to compute volumes of standard dished heads for vertical tanks at various depths by means of following formula:

$$V = 0.01363\ H^2L - 0.004545\ H^3$$

where V = volume of liquid in dish, gal (excluding flanged portion)
H = depth of liquid in dish, inches
L = radius of dish, inches (usually equal to diameter of tank minus six inches)

Typical Example

This computation can be performed readily by means of accompanying nomograph, on which broken index line shows that 190 gallons of liquid are contained in the standard dished head of a vertical tank, when depth of liquid is 10.5″ and radius of dished head is 130″.



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Check 2311 opposite last page.

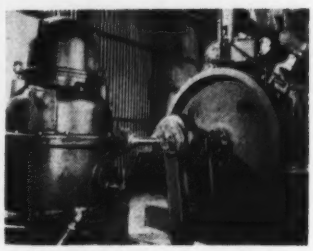
NEW SOLUTIONS

Flexible-cushion coupling ends pumping downtime

Problem: At pumping stations of the American Canals Company in Texas, couplings of the universal-joint type had to be lubricated periodically, resulting in heavy loss of pumpage.

Company operates system of pumping stations which deliver water to irrigation ditches at rate of 32,000 gpm. Ideally, the 175-hp gas engines and propeller pumps run without interruption during six-month-long growing season.

Solution: Early last year, a flexible-cushion-type coupling was installed to reduce down-



This 22" diameter coupling is installed on shafts connecting engine with pump

time for lubrication and replacement. Coupling can handle angular and parallel misalignment and absorb torsional vibration and shock loads.

The 22" coupling was installed on shafts connecting engine with pump. Misalignment was about 4° angular and ⅛" parallel.

Heart of coupling is tire with synthetic tension members bonded together in rubber. Twin flanges clamp tire in place and allow it to flex under stress. They are mounted on shafts by means of bushings. These give equivalent of shrunk-on fit and permit quick application to shafts. Rubber-tire member can be replaced when worn without removing flanges from shafts.

Results: Coupling worked perfectly all season. It required no lubrication or maintenance.

(Para-flex flexible-cushion coupling is product of Dodge Mfg., Corp., Mishawaka, Ind.)

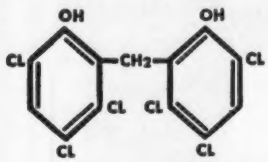
Check 2312 opposite last page.

King of bacteriostats . . .

G-11®

(HEXACHLOROPHENE U.S.P.)

(U.S. Pat. 2,250,480)



Sindar's G-11 (Hexachlorophene U.S.P.) now imparts bacteriostatic and deodorant properties to MORE THAN 2,000 PRODUCTS used in homes, hospitals and industries! Over 95% of America's hospitals use G-11 soaps or detergents for the surgical scrub . . . more consumer dollars are spent for G-11 soaps than for any other brand. In cosmetics and pharmaceuticals, too, **G-11 is the chosen antiseptic.**

Wherever a bisphenol is indicated, see Sindar! Write today for technical information and bulletins describing what G-11 Hexachlorophene *is* . . . and what it can do for *your* product.

SINDAR® *Corporation*
Industrial Aromatics and Chemicals
321 West 44th Street
New York 36, N. Y.

Check 2313 opposite last page.

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65 conveniently located CO_2 Supply Depots and fleets of trucks and rail tank cars insure reliable service and supply.

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Check 2314 opposite last page.

Believed to be one of the more reactive components of aqua regia and long used in separating and identifying organic compounds in the laboratory, this reactive gas may soon find more widespread commercial application.

Nitrosyl Chloride Performs Versatile Nitroso-Chlorination Role

Uses: Compound has often been used to remove crystalline adducts for identification and separation of unsaturated constituents from various natural products, including turpentines and essential oils. Nitrosyl chloride holds promise in this direction on a commercial scale.

Because of its selective formation characteristics it permits a variety of potentially useful intermediates. In essential oil industry where nitrosyl chloride is now generated in situ, a commercially available product could ease preparation of versatile nitrosochlorides. Conversion of orange and grapefruit oil components to essential oils and separation of complex chemicals from natural products are two fields which could benefit.

Another highly useful area of application is typified by reaction between NOCl and isobutylene. Essentially they are reacted at −30°C and reaction product poured over hot (200°C) pyridine to form methacrylonitrile a solvent and potential resin intermediate (US Patents 2,471,928 and 2,518,089). Pyridine acts as a catalyst and is recovered. Methacryldoxime and alkoxyisobutyraldoximes have also been formed.

Because it is a milder chlorinating agent than chlorine and has an important effect on efficiency and yields when used as an additive to chlorination reactions, nitrosyl chloride could be an important raw material in production of chlorinated hydrocarbons.

It can be used conveniently in diazotization of amines in manufacture of dyestuff intermediates in place of sodium nitrite and an acid. Reaction time is decreased and byproducts eliminated. In cold organic media, solid diazonium salts are produced from aniline and p-nitroaniline.

Olefins in cracked petroleum fractions have been converted to nitrosochlorides that react readily with aqueous sodium bisulfite to give sodium alkyl sulfonate derivatives with detergent properties. By controlled chlorination, wool can be rendered less subject to shrinking and felting.

Limited investigations have shown that, in conjunction with other catalysts in hydrocarbon cracking, it can enhance gasoline yields and reduce carbon and tar depositions.

Features: Known for many years as one of components of aqua regia, this reactive, brownish-red gas has heretofore been generated in situ when needed for reaction. Availability in ICC-approved standard ton containers and railroad tankcars with projected large-scale-use prices is now anticipated to permit economic distribution and utilization as a reactive raw material. It reacts with most elements and with an extremely wide range of compounds.

Description: Nitrosyl chloride is a brownish-red gas with a chlorine-like odor. It condenses to a cherry-red liquid boiling at −5.8°C. Liquid nitrosyl chloride is miscible in all proportions with chlorine and nitrogen tetroxide and is soluble in simple aliphatic chlorides such as chloroform, carbon tetrachloride and methylene chloride.

With formula of NOCl, material is generally considered to be a resonance hybrid between normal covalent structure and ionic form. It is nonexplosive but dissociates into nitric oxide and chlorine as temperature increases. At one atmosphere, dissociation reaches 50% at about 300°C.

Like chlorine, nitrosyl chloride provides a warning of its presence by its penetrating and irritating odor. Although no figures are available on relative danger of exposure to air containing various concentrations, it would be expected to have effects intermediate between those of chlorine and nitrogen oxides.

An approved industrial gas mask with an all-service canister is suitable for use in open spaces. For confined spaces an approved hood or helmet-type mask having an auxiliary oxygen supply is recommended.

Some Reactions

Depending upon conditions and material being reacted, nitrosyl chloride can act in several different ways.

Unsaturated hydrocarbons: At ordinary temperatures, nitrosyl chloride adds to double bonds to yield nitrosochlorides. Crystalline nitrosochlorides, useful in terpene chemistry, are formed with olefins having the structure R_2CCHR and R_2CCR. They are formed by passing NOCl directly into olefin at low temperature.

The Cl atoms in nitrosochlorides are very active and give ethers with sodium methylate.

Saturated hydrocarbons: At elevated temperatures, hydrocarbons are chlorinated. Benzyl chloride has been prepared from toluene; methyl chloride, methylene chloride and carbon tetrachloride from methane.

Anilides: Nitrosation of anilides to form N-nitroso compounds is of importance since they act as intermediates for synthesis of unsymmetrical biphenyl derivatives.

$$RCONH\,Ar^{\bullet} + NOCl \longrightarrow RCON(NO)Ar$$

$$RCON(NO)Ar + Ar'H \longrightarrow ArAr' + RCOOH + N_2$$

*Aryl radical

Handling

Lines and valves must be kept clean and dry inside and out to prevent accumulation of moisture, which leads to very rapid corrosion. Nickel, Inconel and Pyrex brand glass pipe are recommended. Also, lead, Koroseal and Saran pipe are satisfactory for use at room temperature and slightly

Nitrosyl Chloride Physical Properties

Specifications	
Nitrosyl chloride, min wt %	93.0
Nitrogen tetroxide, max wt %	5.0
Chlorine, max wt %	2.0
Constants (Pure NOCl)	
Molecular weight	65.47
Boiling point, °C	−5.8
Freezing point, °C	−61.5
Critical temp, °C	167.5
Critical pressure, psia	1323
Vapor pressure, mm Hg	
−20°C	410
0°C	965
20°C	2030
40°C	3880

above atmospheric pressure.

A glass manometer-type laboratory flow meter employing mineral oil will serve to measure NOCl gas flow at ordinary temperatures and up to slightly greater than atmospheric pressure. A rotameter with nickel or Inconel body and float should be used at higher pressures. Diaphragm, differential-pressure flowmeters can be adapted to automatic control and recording.

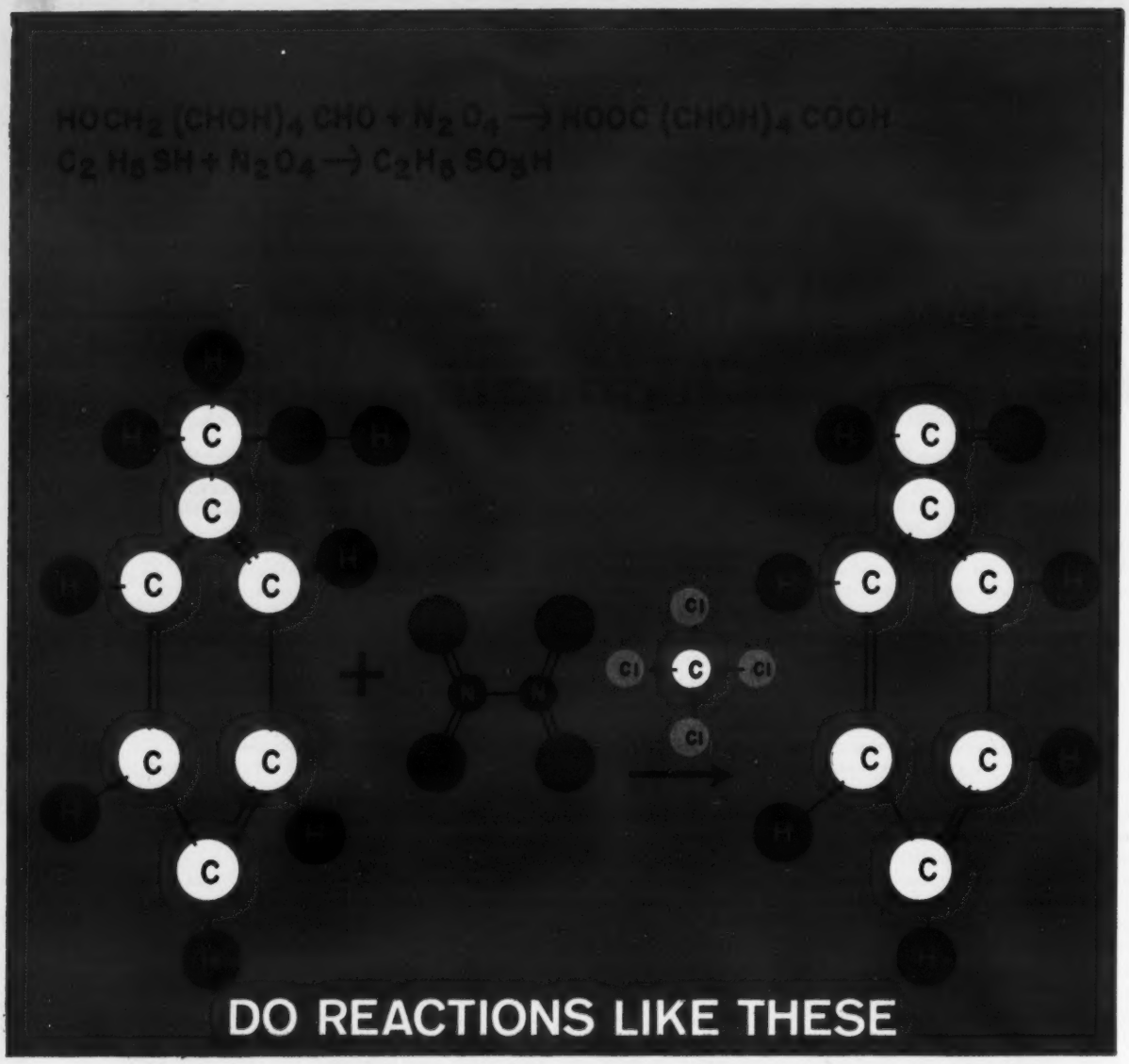
Packaging and Price

Although currently distributed only on a developmental scale, facilities and ICC-approved containers for tonnage quantities can be made available. Nickel cylinders of 55 and 137-lb size are priced at $1.12/lb and $1.00/lb respectively.

For larger-scale uses, a ton container of nickel-clad steel has been approved. Projected price for these quantities is $0.35 to $0.50/lb. Tankcar shipments, in price range from $0.18 to $0.22/lb, would be made in ICC-approved nickel-clad steel cars.

(Nitrosyl chloride is supplied by Henry Bower Chemical Manufacturing Co., Grays Ferry Rd. and 29th St., Philadelphia 46, Pa.)

Check 2316 opposite last page.



HOLD A LOW COST SOLUTION TO YOUR OXIDATION PROBLEMS?

Allied Nitrogen Tetroxide is a low-cost oxidant. It can be used in the wood pulping, rubber, metal recovery, and lubricant purification industries, and for many other applications. Perhaps this versatile chemical can solve some of *your* oxidation problems.

See the box at right for further reactions. For further information and application data on Allied Nitrogen Tetroxide, write for Allied's 59 page product bulletin "Nitrogen Tetroxide".

Allied Nitrogen Tetroxide is shipped in tank-cars, one-ton cylinders, or 125 and 150 pound cylinders.

NITROGEN TETROXIDE CAN BE USED AS A LOW COST OXIDIZER:

- ... At very low temperatures in the form of solutions, such as NO in N_2O_4
- ... In concentrated liquid form from —11° to 21°C
- ... In acids such as sulfuric and nitric
- ... As a gas in form of NO_2 at elevated temperatures
- ... As a solution in carbon tetrachloride or chloroform from 0° to 30°C for such oxidation reactions as
  - Aromatic alcohols to aromatic aldehydes;
  - Alkyl aryl carbinols to ketones;
  - Alcohol groups in starch or cellulose to carboxyl groups;
  - Thiols to sulfonic acid.

For specifications and local offices, see our insert in Chemical Materials Catalog, pages 435 - 442 and in Chemical Week Buyers Guide, pages 35 - 42.

BASIC TO AMERICA'S PROGRESS

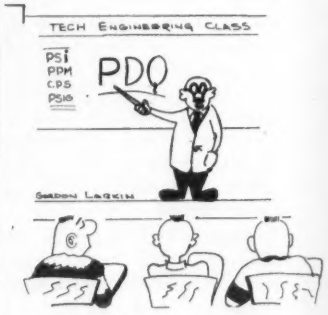
2819

Allied Chemical

NITROGEN DIVISION

Dept. NT13-2-2, 40 Rector Street, , New York 6, N. Y.

Check 2315 opposite last page.



". . . here's another term you'll become familiar with after you enter the field."

THAT'S INTERESTING

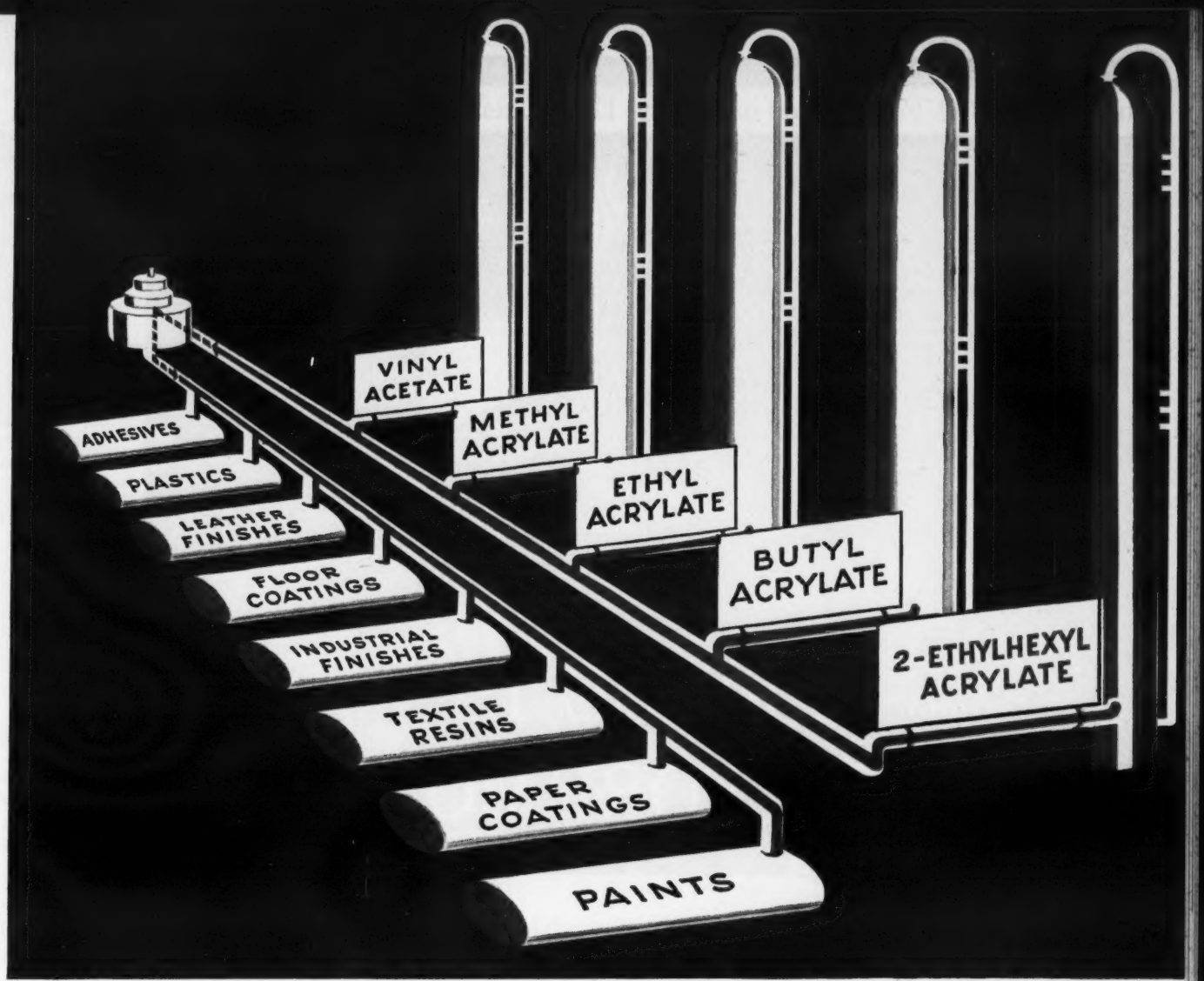
Cable-car subway

Undaunted by a large hill which blocked ready access to the three principal sectors of Haifa, engineers built a cable-car subway. Cars are pulled by a cable up and down inclines and through a tunnel at speeds of 25 mph. Trip that once took half an hour by bus is now made in six minutes.

Checking Einstein

An atomic clock which "ticks" 24 billion times a second is expected to give Einstein's theory of relativity its most minute scrutiny in 43 years. The clock, being developed for an orbiting satellite, will be accurate to within three seconds in 100 billion seconds. This means the clock will be in error no more than three seconds in 3171 years!

For more information on product at right, specify 2317 see information request blank opposite last page.



2-ETHYLHEXYL ACRYLATE

newest in the family of Celanese high purity monomers

Are you interested in the production of acrylic resins? Here's the latest in Celanese high purity monomers, an acrylate ester which provides superior plasticizing efficiency. 2-ethylhexyl acrylate offers improved economies and properties for many copolymer applications. This newest Celanese acrylate monomer is available to you now in commercial quantities to meet all your needs.

Like other Celanese monomers, you can use 2-ethylhexyl acrylate as a comonomer in the production of high quality emulsion paints, paper coatings, textile sizes, backings and finishes, industrial finishes, polymeric wax bases and leather finishes. Its high purity permits rapid reaction, uniform polymerization, and high conversion of monomer to polymer.

For more information on Celanese 2-ethylhexyl acrylate, write to: Celanese Chemical Company, a Division of Celanese Corporation of America, Dept. **591-L**, 180 Madison Avenue, New York, N. Y.

Canadian Affiliate: Canadian Chemical Company Limited, Montreal, Toronto, Vancouver.
Export Sales: Amcel Co., Inc., and Pan Amcel Co., Inc., 180 Madison Avenue, New York 16, N. Y.
Celanese®

Celanese CHEMICALS

For Coconut Oil Fatty Acids or Methyl Esters, remember...

At El Dorado SERVICE IS FOREMOST
OA 419 FOREMOST EL DORADO
7/1/59 458 PM GA PLS
THIS IS ST LOUIS XYZ URGENT
NEED TANKCAR METHYL LAURATE 96
NO LATER THAN 6 DAYS FROM DATE
SOONER IF POSSIBLE

The time is 3:05 A.M. and all is well. At 5 A.M., twelve hours after the above wire was received at Foremost El Dorado's Oakland, California plant, this tank car loaded with Eldo Methyl Laurate 96 will be rolling.

Four days and 2400 miles later in St. Louis, an anxious Foremost customer will relax. This same tank car will roll to his siding, the seal on the dome will be broken and 8000 gallons of Methyl Laurate will be ready for use . . . a full day ahead of schedule.

This kind of quick service . . . along with strict attention to the *purity* and *uniformity* of product . . . has made Foremost El Dorado a dependable source of coconut oil products for over 65 years.

Let us serve you with the same dependability

Even faster deliveries from Eastern and Mid-Western shipping points. Contact the agent nearest you or write for samples and specifications. Dept. B-1

FATTY ACIDS			METHYL ESTERS		
Caprylic	Capric	Lauric	Caproate	Caprylate	Caprate
Myristic	Palmitic		Laurate	Myristate	Palmitate
Cocoleic	Eldhyco	Coconut	Oleate	Eldo*18	Coconate

*T. M. REG.

FOREMOST FOOD AND CHEMICAL COMPANY
EL DORADO
P. O. Box 599, Oakland 4, California

Atlanta: Geo. E. Missbach & Co.
Boston: N. S. Wilson & Sons
Chicago: M. B. Sweet Company
Cleveland: F. W. Kamin Company
Detroit: Harry Holland & Son, Inc.
Houston: Joe Coulson Company
Kansas City: Vulcan Sales Company
Minneapolis: M. H. Baker Company
New Orleans: Breffeilh & Sheahan Company
New York: H. Reisman Company
Oakland: Foremost Food & Chemical Co.
Oklahoma City: Rullman Brothers
St. Louis: Harry A. Baumstark & Company

Check 2318 opposite last page.

CHEMICAL MATERIALS

Liquid SO_3 stabilized in low-melting form

Uses: Synthesis of high-strength surface-active agents, dye intermediates, insecticide emulsifiers, and lubricating oil additives, where compounds with higher molecular weights can be sulfonated to produce desirable oil-soluble sulfonates.

Features: Stabilizer provides additional handling tolerance by maintaining sulfur trioxide in low-melting form.

Description: Physical properties of liquid sulfur trioxide include: molecular weight (of monomer), 80.06; boiling point (at 760 mm Hg), 44.8°C; specific gravity (at 32°C), 1.86; specific heat (liquid at 25-35°C), 0.77 Btu/lb °F, and (gas at 50°C) 0.16 Btu/lb °F; heat of vaporization (at 44.8°C), 235 Btu/lb; critical pressure, 83.8 atm; and critical temperature, 218.3°C.

(Liquid sulfur trioxide is development of Grasselli Chemicals Department, E. I. du Pont de Nemours & Company, Wilmington 98, Delaware.)

Check 2319 opposite last page.

Reactive double bond and primary hydroxyl combined in alcohol

Stable water-white liquid yields useful products

Uses: Product is potential intermediate for acrylic copolymers; ester polymeric and epoxidized plasticizers; and pharmaceuticals.

Features: Compound combines in a single structure a reactive double bond and primary alcohol. Hydroxyl group readily undergoes reactions typical of primary saturated alcohols. Double bond undergoes additional reactions typical of olefins and in free-radical-initiated polymerizations behaves as a vinyl monomer.

Description: Material is 2-hydroxymethyl-5-norbornene, a stable water-white liquid. A powerful high-boiling solvent, it is infinitely miscible with most common solvents.

Two reactive sites give Cyclol wide reactivity

Physical Properties	
Boiling point, °C (70 mm)	129
Flash point, °C (open cup)	84

Product, designated Cyclol by manufacturer, is now available in multiple drum quantities.

(Cyclol is a product of Interchemical Corporation, 67 W. 44th St., New York 36, N.Y.)

Check 2320 opposite last page.

Emulsion has tolerance to borax, and organic solvent compatibility

Cast films have advantages of internal plasticization

Uses: Emulsion is suggested particularly for use in adhesives, in textile finishing, paper coatings, surface coatings, and as a beater additive in paper manufacture.

Features: Product combines borax tolerance with a high degree of compatibility with organic solvents.

Description: Borax-stable polyvinyl-acetate dibutyl-maleate copolymer emulsion has a particle size distribution from 0.2 to 1.5 microns. It exhibits excellent freeze-thaw and mechanical stability. Films cast from the resin exhibit advantages usually associated with internal plasticization.

(Resin D-243 is a product of Shawinigan Resins Corporation, Department AS, Springfield, Mass.)

Check 2321 opposite last page.

BRIEFS

on some recent developments in sodium chlorate...an easy way to get benzyl groups... what to look for in muriatic acid specs

Keeping up with the sodium chlorate demand

There has been such a surge of interest in sodium chlorate during the past few years that we have had the happy obligation of expanding our facilities three times.

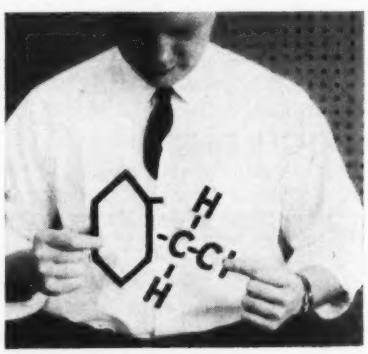
The most recent addition has been onstream at our Columbus, Mississippi plant since February of this year.

This more than doubles the capacity this plant started with in 1954. Of course, in addition we also have large production facilities at our Niagara Falls location.

Much of this new tonnage is going into chlorine dioxide generation. As you probably know, the pulp and paper people are mostly responsible for this, but there is growing interest in other areas also.

New drum empties faster. Recently we introduced this new drum style on our sodium chlorate. A single lever seals and reseals the drum with a metal band. The full head area is opened for use. The old-style drum had a smaller opening and required the manipulation of four lugs for sealing. The new drum comes in 100 and 400-lb. net weights.

Data for your files on our sodium chlorate are offered in the coupon.



Handy way to get benzyl groups

If you want to tag benzyl groups onto some compound you're working with, we offer for your inspection Hooker benzyl chloride.

Here's a compound that's been around some time, so we have no trouble making it to specs in short time in any quantity.

The benzyl group of the compound reacts readily and can be easily led to fit into your own formulation.

The benzyl chloride we make is a clear liquid, colorless or light yellow to the eye. It has a characteristic pungent odor. It's insoluble in water but dissolves readily in alcohol and ether.

If you'd like a look at our specifications and typical data, we ask only that you fill out the coupon and send it to us.

We have a very similar story to tell on benzoyl groups as we make benzoyl chloride, too. So we also offer data on this chemical in the coupon.

What to look for in muriatic acid specs

This white gummy substance is an insoluble precipitate which can form in certain reactions with muriatic acid that contains too much sulfate.

Iron, arsenic, and free chlorine can also give a process indigestion when their level in muriatic acid is too high.

So it pays to consider these carefully when you examine any muriatic's specs.

Take Hooker White Grade muriatic, for example. Iron: a mere 0.0001% at the most. Sulfates: less than 0.003%. Free chlorine: none. Arsenic: none.

This Hooker White Grade is probably the purest muriatic you can buy anywhere in volume.

Very often your process can stand a little higher level of these impurities.

Hooker Commercial Grade offers these maximum specs: Iron: a low 0.0005%. Sulfates: 0.003%. Free chlorine: a slight trace. Arsenic: none.

Both grades are delivered in rubber-lined tank cars. Both are available in three strengths: 18°, 20°, and 22° Baumé.

For more complete technical data, check the coupon. And, if you'd like samples of either grade, just write us on your business letterhead to speed delivery.

For more information, check here and mail with your *name, title,* and *company address.*

☐ Sodium Chlorate ☐ Benzoyl Chloride
☐ Benzyl Chloride ☐ Muriatic Acid

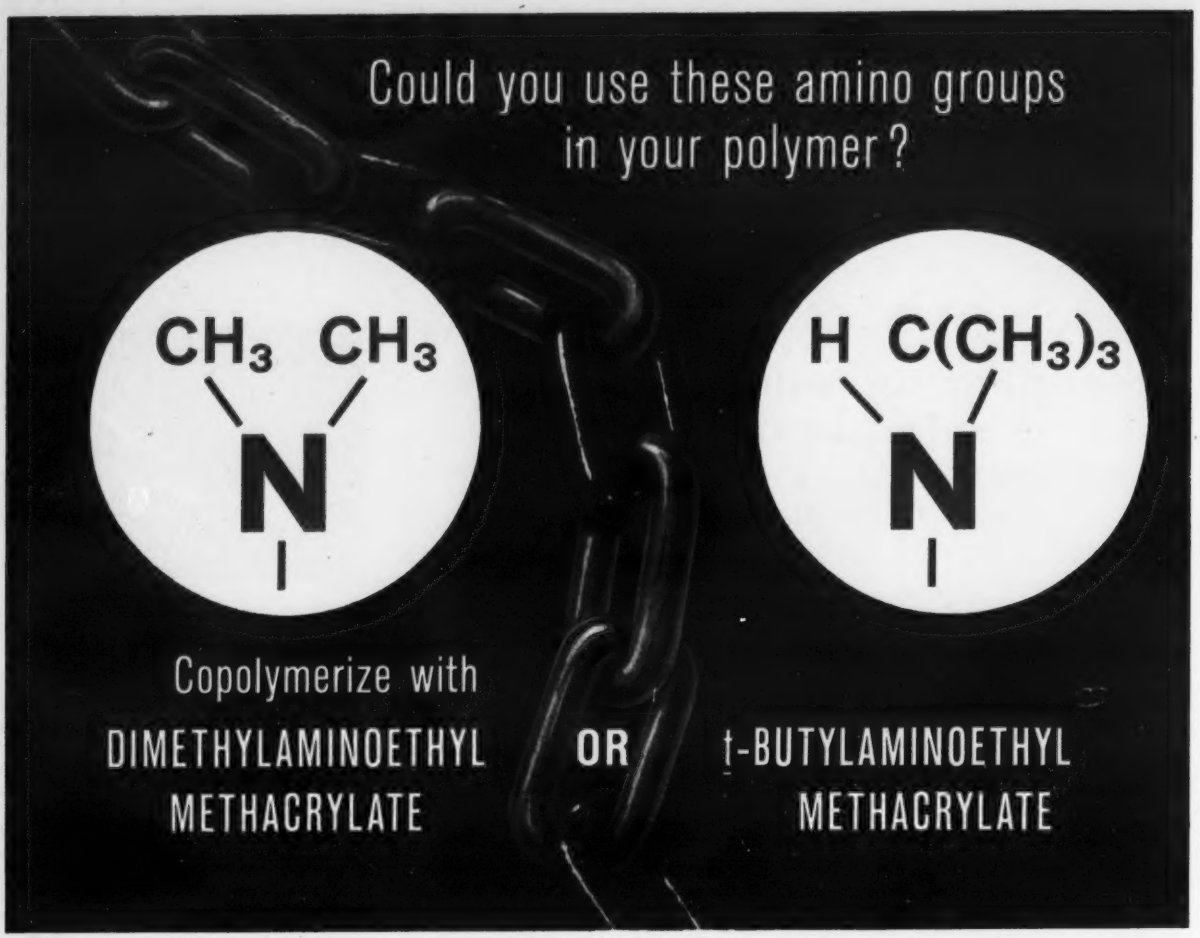
When requesting samples, please use business letterhead to speed delivery.

HOOKER CHEMICAL CORPORATION
512 FORTY-SEVENTH STREET, NIAGARA FALLS, N. Y.

Sales Offices: Chicago Detroit Los Angeles New York Niagara Falls Philadelphia Tacoma Worcester, Mass.
In Canada: Hooker Chemicals Limited, North Vancouver, B. C.

HOOKER CHEMICALS PLASTICS

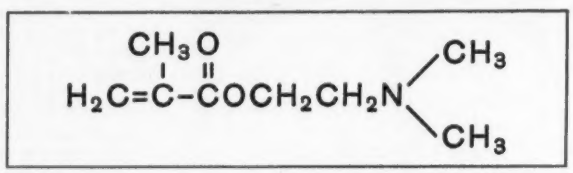
Check 2322 opposite last page.

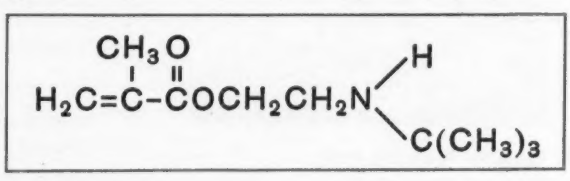


Do you need a copolymer with basic properties?—Copolymerization of Dimethylaminoethyl Methacrylate or *t*-Butylaminoethyl Methacrylate with monomers such as acrylonitrile, butadiene, acrylic or methacrylic esters, styrene, or vinyl acetate could solve your problem.

Vinyl polymerization and addition to the double bond are reactions common to both monomers. Dimethylaminoethyl Methacrylate is very soluble in water; it can be polymerized to a water-soluble cationic polymer, or copolymerized with acidic monomers such as methacrylic acid to give amphoteric polyelectrolytes. Copolymers of *t*-Butylaminoethyl Methacrylate exhibit good color characteristics. Individual reactions include: Dimethylaminoethyl Methacrylate—salt formation and quaternization; *t*-Butylaminoethyl Methacrylate—typical reactions of the amine group via the active hydrogen. Both monomers are soluble in all common organic solvents.

These monomers are suggested as intermediates for producing anchoring agents for dyes, pigments, waxes, oils, and moisture proofing compounds to various substrates . . . dispersing agents for non-aqueous systems . . . antistatic agents . . . stabilizers for chlorinated polymers . . . ion exchange resins . . . emulsifying agents . . . and cationic precipitating agents. Both monomers are available in development quantities. Samples and technical data can be secured by writing to Dept. SP-5.





Chemicals for Industry

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Check 2323 opposite last page.

Polyester film component has hydrolytic and thermal stability

Alicyclic glycol contains two primary hydroxyls

Uses: Product is recommended for the preparation of polyester films and urethane elastomers.

Features: Two primary hydroxyl groups of this alicyclic glycol react readily. It is reported to have excellent thermal and hydrolytic stability.

Description: Product is 1,4-cyclohexanedimethanol and is supplied as a 70% solution of the stereoisomeric mixture in methanol. Solvent-free material analyzes 97.5% 1,4-cyclohexanedimethanol comprising 32.2% of the cis isomer, and 67.8% of the trans isomer.

Typical Properties

Methanol Solution

Refractive index $\{n^{20°}_{D}\}$	1.4362
Saponification No.	2.05
Color, ppm (APHA)	0
Sp gr, 25°C	0.9675
Viscosity, cs (77°F)	28.00

(Cyclohexanedimethanol is a product of Eastman Chemical Products, Inc., Subs. of Eastman Kodak Company, Kingsport, Tenn.)

Check 2324 opposite last page.

Aluminum stearate line gels mineral oils for grease making

Uses: Gelling mineral oils of a wide viscosity range to form various grease types.

Features: Gelling characteristics of these aluminum stearates permit reduction in stearate requirements for a given grease consistency. Greases produced are reported to have excellent stability and high dropping points.

Description: Products are gel-tested aluminum stearate soaps. Three types are available: GG-200, and GG-250

are high-gelling products; GG-300 is an intermediate gelling soap that produces a smooth, stable grease of moderate consistency in most base oils.

(Aluminum stearate soaps are products of Nuodex Products Company, Div. of Heyden Newport Chemical Corporation, Box 242, Elizabeth, N. J.)

Check 2325 opposite last page.

Azoic dyestuffs aged neutrally

Uses: Series of azoic dyestuff compositions were especially developed for printing applications where neutral aging is necessary.

Features: Colors can be developed either with neutral or acid steaming. When printed alongside fiber re-active dyes or vat colors, entire pattern can be developed by neutral aging.

Description: Metrozol colors are available in either powder form or in solution. Color range includes yellow NG, scarlet N3R, scarlet FNR, red NG, red NR and blue NB.

(Metrozol colors are product of Metro-Atlantic, Inc., Centredale 11, R. I.)

Check 2326 opposite last page.

Carbon^{14} compounds custom synthesized

Custom synthesizing of chemical compounds labeled with radioactive carbon^{14} offers biomedical or industrial researchers a source of unusual or non-stock compounds. Information on compounds required should include total radioactivity, specific gravity, and position of labeling desired. An evaluation normally requires 30 days, at which time customer is advised of production feasibility, price and delivery.

(Custom synthesis of carbon^{14} compounds is a service of Nuclear-Chicago Corporation, 333 E. Howard Ave., Des Plaines, Ill.)

Check 2327 opposite last page.

TBP

TRIBUTYL PHOSPHATE

1. SOLVENT EXTRACTION OF METAL IONS TBP provides extensive application for solvent extraction of metals and rare earths in the form of their nitrate salts. This is particularly true for metals associated with the atomic energy processes, beginning with the initial preparation of the ores and on to the recovery of the metals from spent reactor fuels.

2. OUTSTANDING ANTI-FOAM AGENT Tributyl Phosphate leads the field in the control of foam during the manufacture, can-filling, and final application of synthetic latex emulsion paints. TBP is preferred, too, for paper coatings, water adhesives, casein solutions, inks, textile sizings and detergent solutions. Tributyl Phosphate offers exceptional cost-efficiency value and minimal residual odor.

3. SUPERIOR HEAT EXCHANGE MEDIUM As a fluid heat exchange medium, Tributyl Phosphate is notable for being useful over such a wide range of temperature. When compared with aqueous solutions and halogenated compound, TBP offers many unique advantages. It is non-corrosive, non-flammable, non-volatile and is of a low order of toxicity.

TBP Can Help You! Mail Coupon!

INDUSTRIAL CHEMICALS DEPT.
COMMERCIAL SOLVENTS CORP.
260 MADISON AVE.
NEW YORK 16, N. Y.

Please send me additional information on Tributyl Phosphate with regard to its use in:

☐ solvent extraction.
☐ foam reduction.
☐ heat exchange use.

Name_____

Title_____

Company_____

Street_____

City_____ Zone____ State____

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COMMERCIAL SOLVENTS CORPORATION
260 MADISON AVE., NEW YORK 16, N. Y.
Atlanta • Boston • Chicago • Cincinnati • Cleveland • Detroit • Kansas City
Los Angeles • New Orleans • Newark • New York • St. Louis • San Francisco
IN CANADA: McArthur Chemical Co. (1958) Ltd., Montreal • IN MEXICO: Comsolmex, S.A., Mexico 7, D. F.

Check 2328 opposite last page.

NOW...*meeting your need for an efficient and economical*

stereospecific catalyst...

...**TRONA'S NEW PLANT** for the commercial production of

n-Butyllithium

Here's the answer for your process involving a low cost and efficient stereo specific catalyst. Trona's new and versatile plant makes n-Butyllithium available in *commercial quantities* for applications such as a low pressure olefin polymerization catalyst... a stereospecific catalyst for isoprene... or for other metal-organo reactions.

availability... 10 or 15% concentrations,... in a variety of solvents, containing minimum impurities. Quantities from a pound to a ton.

versatile production... in addition to n-Butyllithium, the above plant can also produce various alkyl and aryllithiums.

Consult with Trona's technical staff on your investigative needs. Technical literature available on request.

TRONA

MARKET DEVELOPMENT DEPARTMENT

American Potash & Chemical Corporation

3000 WEST SIXTH STREET, LOS ANGELES 54, CALIFORNIA, DUNKIRK 2-8231
99 Park Avenue, New York 16, N.Y., OXford 7-0544

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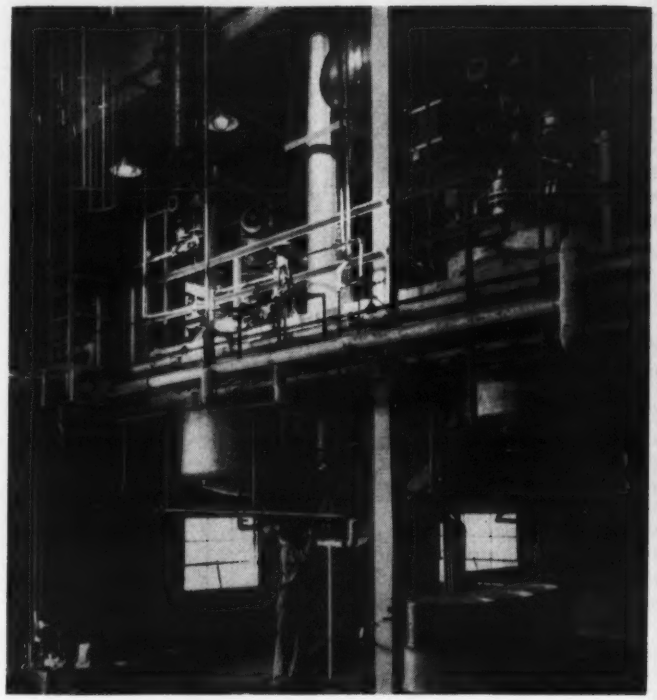


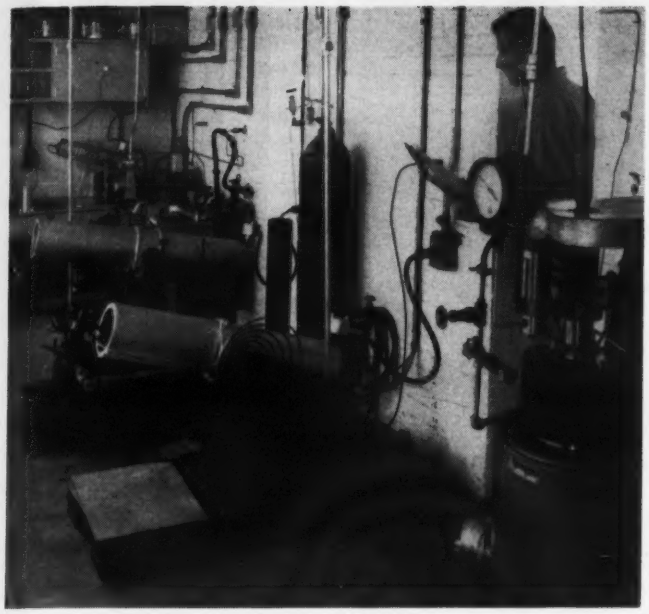
Glass-lined reactors used to produce phenyl ethyl alcohol through a Freidel-Crafts reaction of ethylene oxide and benzene at IFF's Union Beach, New Jersey, plant

Making scents — an ancient art gets a boost from modern chemistry

CHARLES P. WALKER
President
International Flavors and Fragrances, Inc.

Traditionally, fragrance materials are associated in the public's mind with the exotic and the unique; with far-away lands, rare plants, ambergris from the whale and grasses from the dark jungle of Java. In one sense this is true — natural products are still used and are still important in finished formulations. However, not only the public, but even those technically trained may not fully appreciate to what extent chemistry, chemical research and chemical production techniques have become essential to the creation of modern flavors and fragrances.

At the Union Beach, New Jersey, plant of International Flavors and Fragrances, Inc., a variety of modern chemical processes are used to manufacture flavor and fragrance materials of a synthetic nature. Over 450 synthetic aromatic products have replaced or supplemented natural ones. Among these are phenyl ethyl alcohol, which has a rose odor, and the ionones which have a violet scent.



Hydrogenation research laboratory at Union Beach, N.J. It was here that company's high-pressure hydrogenation process was developed

CHARLES P. WALKER has served as a sales executive with Merck, general sales manager and a director of Pfizer, and is now president of International Flavors and Fragrances Inc., formed by the recent merger of van Ameringen-Haebler of New York, and Polak & Schwarz of Zaandam, Holland

Production Processes

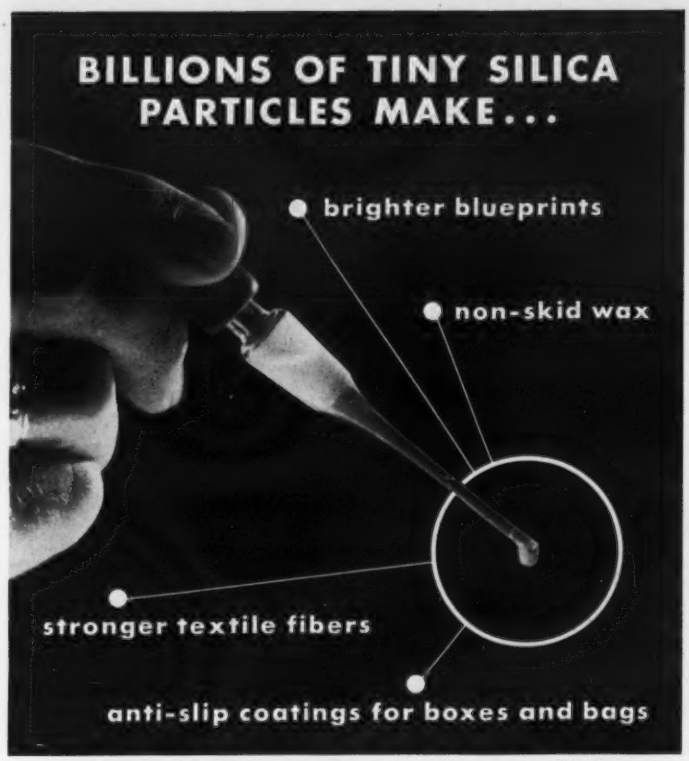
To produce phenyl ethyl alcohol, a Friedel-Crafts reaction is employed. Ethylene oxide and benzene are reacted in presence of aluminum chloride powder. Excess benzene serves as a solvent medium. Cold brine, circulated through jacket of 1500-gal, agitated, glass-lined steel reactor, maintains temperature around 0-15°C.

Reaction is water quenched and excess benzene stripped out in a ceramic-saddle-packed, 15-foot tower. Final purification takes place in three, ceramic-packed vacuum fractionation columns, each 35 feet tall.

One of the most versatile of synthetic aromatics, dimethyl benzyl carbinol, is produced by a reaction common in laboratory work but rarely used in production . . . the Grignard. Benzyl chloride, acetone and ethyl ether are reacted in presence of thin turnings of magnesium. Resulting crude product is purified by vacuum fractionation.

Catalytic hydrogenation has long been an important process for manufacture of valuable synthetic aromatics. Citronellol, a mixture of alcohols which has a unique rose-like odor, is produced by pressure hydrogenation of citronellal or geraniol.

A continuous high-pressure hydrogenation process is a more recent development in this technology. It assures purer products by eliminating byproducts and unwanted isomers by permitting a shortened reaction time and im-



Silica particles that accomplish these tasks are of millimicron size. There are more than a million billion of them in a single drop of Nalcoag!

Nalcoag® COLLOIDAL SILICAS

One enterprising Nalco Lab man poured Nalcoag on his shoelaces to keep them from coming untied. Frictionizing effect was so good it quickly wore the laces to pieces . . . Back to the test tubes for him.

Making brighter blueprints does not come under the heading of frictionizing—but neither do a lot of other Nalcoag applications in industry. For simple colloids of silica microspheres in water and/or alcohol, the Nalcoags have a remarkable range of *known* uses, and we invite you to help hunt for some of the interesting *unknowns* of possible profit to you.

Or,

Perhaps some of the current places where Nalcoag is at work may show parallel potential for you. They are described, with Nalcoag properties and characteristics in Bulletin K5, available on request.

Nalcoag products in concentrations from 15% to 35% are promptly available.

Call or write today.

National Aluminate Corporation is now

NALCO CHEMICAL COMPANY

6294 West 66th Place — Chicago 38, Illinois

Subsidiaries in England, Italy, Mexico, Spain, Venezuela and West Germany

In Canada—Alchem Limited, Burlington, Ontario

Nalco®

...Serving Industry through Practical Applied Science

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Check 2330 opposite last page.

Here are five ways to use versatile-flexible

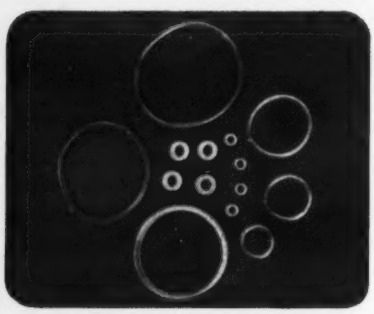
TYGON®

AS TUBING OR HOSE to pipe taste-sensitive liquid foods or corrosive chemicals. Tygon Tubing is glass-clear, flexible as a piece of string, resistant to acids and alkalies, non-toxic, sterilizable, and is made in bores from 1/16" to 4".

AS A PAINT to protect plant and equipment from attack by corrosive fumes and gases. Applied by brush or spray, Tygon air dries quickly to form a tough impermeable plastic skin that shrugs off acids, alkalies, oils, water and alcohols.

AS A HEAVY-DUTY LINING to protect the interior of pickling, plating, chemical processing and storage tanks from destruction by corrosive solutions. Easier to install than rubber linings, Tygon can be applied to tanks of any size or shape.

AS A CORROSION-RESISTANT GASKETING. Tygon shows no chemical deterioration with age. Gaskets remain flexible and tight, unaffected by weather or exposure to chemicals. Tygon gaskets are available in an almost unlimited size range.



AS MOLDED ITEMS. Tygon's toughness, durability and flexibility, coupled with staunch chemical resistance, offer pronounced performance characteristics for grommets, washers and molded mechanical goods items in virtually any shape.

Few materials offer more versatility in use than the Tygon series of thermoplastics. In whatever form they are used: tubing, coatings, sheet materials or molded goods, the Tygons are characterized by superb resistance to chemical attack. It shrugs off with equal ease both acids and alkalies. If corrosion is a problem in any product you make, Tygon may prove the perfect answer.

WRITE TODAY for the TYGON PORTFOLIO. *Pertinent data and technical characteristics of the various Tygon compounds to enable you to determine just how you can use Tygon most advantageously. Free, on request. Address Dept.* CP 1259

OUR 100th YEAR

PLASTICS AND SYNTHETICS DIVISION

U. S. STONEWARE

AKRON 9, OHIO

NEW YORK • CHICAGO • HOUSTON • LOS ANGELES

414-F

Check 2331 opposite last page.

proved control of conditions. Thus, a superior quality of citronellol will be obtained by this commercial technique by avoiding dimethyl octanol formation.

There are a number of reasons for this increasing application of chemical technology:

Important considerations are consistency of formulations and ready availability. A synthetic aromatic chemical of known structure can be produced in unvarying quality and unlimited quantities. When it comprises a substantial part of a formulation, it creates a more stable condition than would be possible with purely natural materials. This is of utmost importance since it frees the manufacturer, to a large extent, from dependence on the weather, the size of natural crops, and the political and economic conditions throughout the world.

From a marketing standpoint, it is a matter of providing fragrances and flavors to meet the ever-increasing demand for the exceptional, the unique, and the sales-stimulating. Competition, particularly in the soap and cosmetic industries, is intense, and merchandisers of products in these fields are becoming increasingly aware of the "fragance factor" in their products.

Historically, the perfume and flavor chemist has been closely allied with the organic chemist. The next few years will see the complete re-styling of many well-known consumer products and the consequent need for improved flavors and fragrances. Depth in chemical technology and long experience in creative development will provide an increasing number of flavors and fragrances destined to play an important part in stimulating sales and cementing consumer loyalties.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

Premature blowing halted by higher decomposition temp of blowing agent

Uses: Blowing agent for plastics and rubber.

Features: Blowing agent decomposes in temperature range of 240 to 250°C, some 50°C higher than nitrogen-releasing agents presently available. High decomposition temperature permits processing of compounds at temperatures up to 220°C without danger of premature blow.

Description: Product is a nitrogen-releasing blowing agent which should find wide application in high melting polymers, such as linear polypropylene, high density polyethylene and Nylon 6 resins. Research quantities are available for distribution with modest semi-work scale production expected in the near future.

(Expandex 177 blowing agent is a product of National Polychemicals, Inc., Wilmington, Massachusetts.)

Check 2332 opposite last page.

Firm bonds formed between vinyls and acrylics

Cements will join flexible or rigid materials

Uses: Cements provide fast softening and fusing action between flexible and rigid vinyl sections or vinyl and acrylic sections.

Features: Product forms a firm bond with either vinyls or acrylics, including those with irregular contours.

Description: Cements, designated VC-1 and VC-2, are water white formulations. Type VC-1 is free flowing to make it particularly suited for soak-method application by felt pad contact in shallow pans; VC-2 is heavier bodied for simple brush use.

(Cements VC-1 and VC-2 are products of Schwartz Chemical Company, Inc., 50-01 Second St., Long Island City 1, N. Y.)

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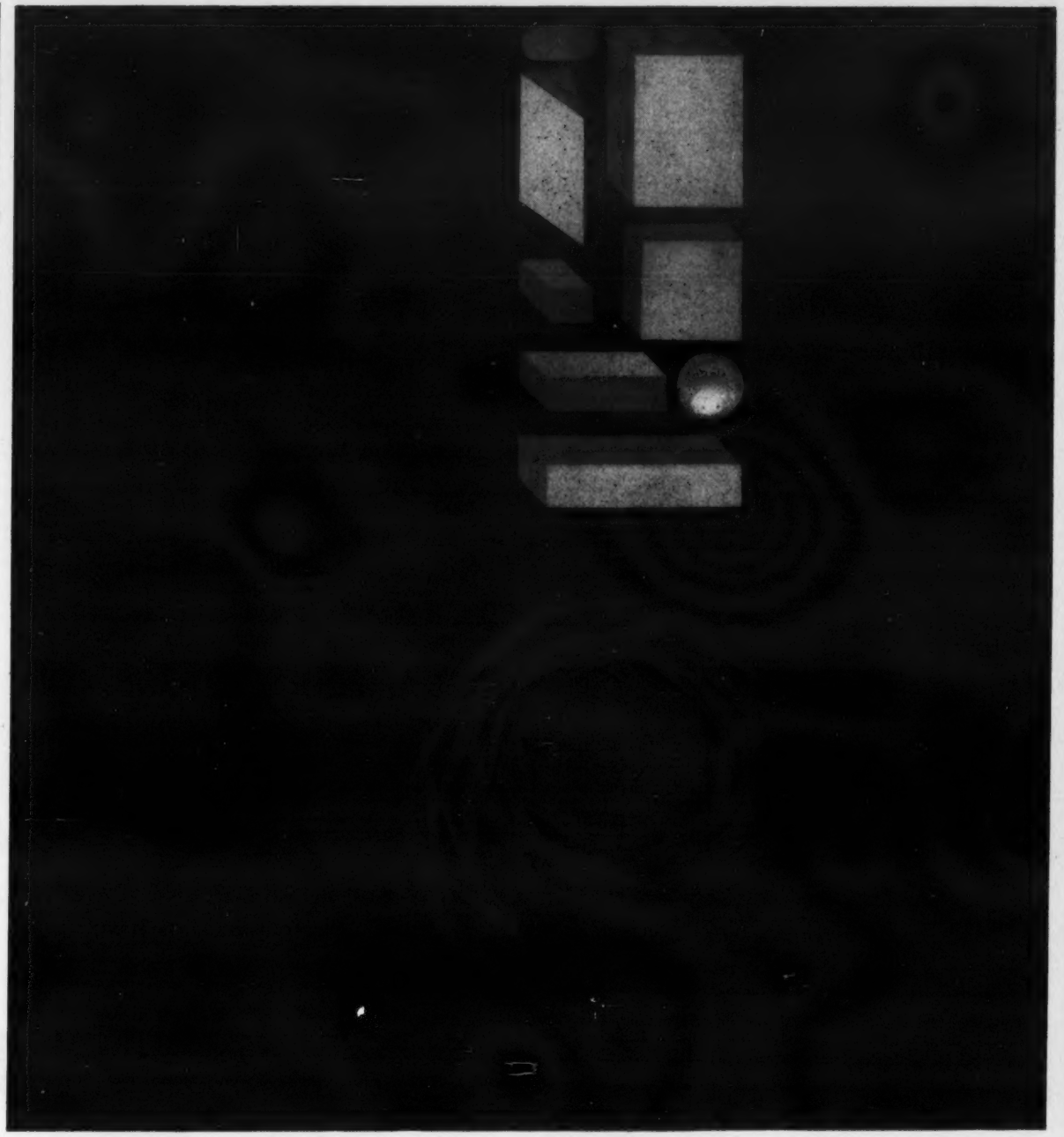


Don't let rising process heats ruin your refractories

...or your profits... *mix imagination with Alcoa Aluminas*

The steady increase in general process temperatures poses no problem at all for refractories fortified with ALCOA® Aluminas. Their refractoriness rises in direct proportion to the amount of alumina in their composition. These high-purity aluminum oxides also add greatly to strength and stability under load at elevated temperatures. And high-alumina refractories are chemically stable, immune to both oxidizing and reducing atmospheres. They offer just one more illustration of the many good reasons why makers and users of a variety of products have found it pays to *mix imagination and engineering with Alcoa Aluminas . . . to make an old product better or a new product possible.* Discover what ALCOA Aluminas can do for your own product or process. Outline your requirements in a letter to ALUMINUM COMPANY OF AMERICA, CHEMICALS DIVISION, 707-M Alcoa Building, Pittsburgh 19, Pennsylvania.

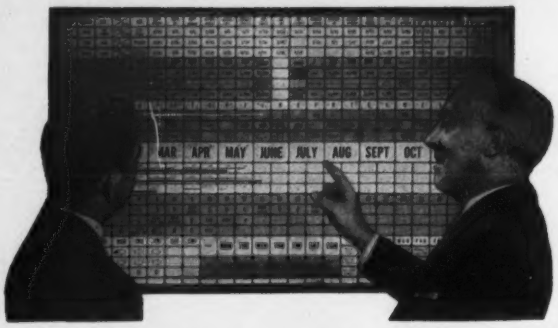
ALCOA CHEMICALS
ALUMINUM COMPANY OF AMERICA

For exciting drama watch "Alcoa Presents" every Tuesday, ABC-TV, and Emmy Award winning "Alcoa Theatre" alternate Mondays, NBC-TV

For finer products . . . let Alcoa add new dimension to your creative thinking!

Check 2334 opposite last page.

You Get Things Done Better By Seeing What's Happening



BOARDMASTER VISUAL CONTROL

★ Gives Graphic Picture of Your Operations in Color.
★ Easy to Use. Type or Write on Cards, Snap on Board.
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GRAPHIC SYSTEMS, 55 West 42nd St., New York 36, N.Y.

Check 2335 opposite last page.

CONTROL AIR POLLUTION!

FREE BROCHURE TELLS YOU HOW

Now learn how you can clean up combustible pollutants, fumes and odors from your processes. An Oxy-Catalyst System can be engineered to your special requirements. Catalytic oxidation is the most effective air pollution control and waste heat recovery method ever developed! Installation often leads to actual fuel savings. Investigate! Send today for brochure, "Oxycat Systems"—packed with facts and figures on typical industrial installations. Mail coupon below.

OXYCAT **OXY-CATALYST, INC.** Wayne 7, Pa., U.S.A.
Catalysts for fume and odor elimination, air pollution control and waste heat recovery

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Check 2336 opposite last page.

CHEMICAL MATERIALS

Sulfur staining minimized in metal-organic, organic vinyl stabilizers

Uses: Stabilizing polyvinyl chloride formulations.

Features: Series of metal-organic and organic vinyl stabilizers and activators minimize sulfur staining tendencies usually characterized by the use of cadmium-barium compounds.

Description: Seven compounds are included in recently introduced line:

AB-61 liquid cadmium-barium vinyl stabilizer reduces plate-out tendencies of vinyl formulations. It is recommended for maintaining maximum clarity of non-pigmented stocks.

C-55 liquid zinc-organic complex is designed for use with AB-61 to obtain maximum heat and light stabilization.

AC-23 barium-zinc soap of a fatty acid offers good heat and light stability to polyvinyl chloride formulations with complete freedom from sulfur stain.

AB-19 cadmium-barium soap of a fatty acid is a high barium to cadmium ratio powder that provides a long-term heat stability.

BA-13 is a free-flowing white powder cadmium-barium complex.

K-60 liquid organic complex functions as an antioxidant and chelating agent. It is an organic activator for use with cadmium-barium and zinc stabilizer systems.

K-70 liquid organic complex contains no metallic components. It functions as an antioxidant and chelating agent for use with cadmium-barium or zinc-barium stabilizers.

(Metasap vinyl stabilizers are supplied by Metasap Chemical Company, 60 Park Place, Newark, N. J.)

Check 2337 opposite last page.

Polypropylene for molding and extrusion added to company's line

Uses: Manufacture of molded and extruded products of polypropylene.

Features: End products will withstand steam sterilization, maintaining their shape at temperatures above 300°F. Supplier indicates that compound exhibits superior molding and extrusion characteristics over a wide range of processing conditions. Existing

Same formula as famous Kroil that has pleased 14,000 industrial users for 10 years or more.
Loosens stuck together metal parts, bushings, bearings, bolts, screws, pipe, etc., "anything from an embalmer's needle to a bulldozer," one customer said.
"Like an extra employee," said another. "Turned rust into mush, put $50,000 equipment back to work."
You too can get these results.
Try Aerokroil at our risk. Send $2 cash, and we'll pay postage.
12-OZ. CAN $2. F.O.B. NASHVILLE CASE OF 12 $18.75

KANO LABS. 1051 S. Thompson Lane Nashville 11, Tenn.

Check 2338 opposite last page.

DAWE'S

a dependable source for

SODIUM GLUCONATE and GLUCONIC ACID

Promptly available in any quantity.

Warehouse stocks across the country.

Dawe's high quality is assured.

Write for technical data and samples.

DAWE'S LABORATORIES, INC.
4800 South Richmond Street
Chicago 32, Illinois

Dawe's

Check 2339 opposite last page.

equipment can be used.

Description: Polypropylene is available in three grades: general purpose; heat resistant for extended service life at high temperatures; and ultraviolet resistant. Low specific gravity of 0.091 permits greater yield of finished pieces per pound of resin.

(Polypropylene resin is supplied by Catalin Corporation of America, One Park Ave., New York, N. Y.)

Check 2340 opposite last page.

Low formaldehyde odor in resin eliminates afterwash process

Uses: Imparts a high quality crease and shrink resistance to both natural and synthetic fabrics.

Features: Low free-formaldehyde content cuts odor problems and has permitted some finishers to eliminate afterwash processes.

Description: Thermosetting resin (C-Tron) has a low free-formaldehyde content.

(C-Tron resin is a product of Crown Chemical Corporation, 240 India St., Providence 3, Rhode Island.)

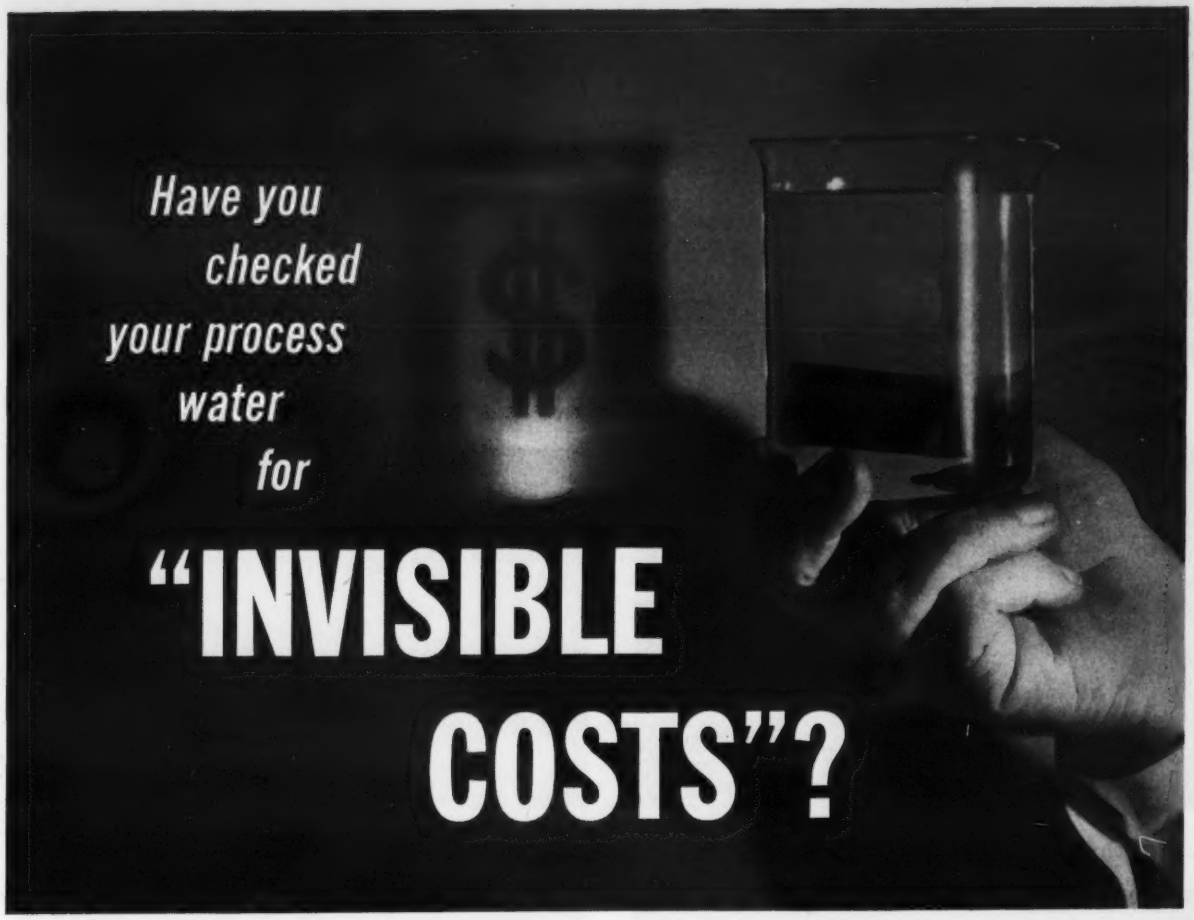
Check 2341 opposite last page.

Steam, electricity costs cut by low-temperature phosphating compound

Phosphating compound operates at a temperature as much as 75°F lower than that required by conventional phosphating processes. When operating at 95°F, product provides phosphate coating on iron, steel or zinc equal to those provided by processes requiring operating temperatures up to 180°F. It can be applied by immersion or spray washer, and is said to effect savings of approximately 75% in steam, water, electricity and downtime costs.

(Turcoat Low Temp phosphating compound is a product of Turco Products, Inc., 460 S. Main St., Wilmington, Calif.)

Check 2342 opposite last page.



Often unsuspected—and hence ignored—the "invisible costs" in process water can have serious long-term effects. Hence, the growing concern of many engineers—and their discovery that these invisible costs can be sharply reduced by filtration with Dicalite Filteraids.

"INVISIBLE" TURBIDITY Many chemical pretreatments do not remove microscopic solids found even in "clean" water. Since these colloidal particles are usually gelatinous or slimy, as small an amount as 1 ppm can have adverse effects on product quality, on other processing materials such as demineralizers and resins, or on pumps, screens and piping systems. Filtration of the raw water with Dicalite Filteraids can produce a process water which is cleaner, more free of bacteria and algae, than is required for municipal supply.

FUEL COSTS When process water must be heated, it often ends its cycle 80° to 100° warmer than at input. Some plants have found that filtering and recycling this warmer water saves enough in fuel costs to make an actual profit on the filtration.

LOSS OF PROCESS MATERIALS In industries as diverse as metallurgy and papermaking, filtration with Dicalite or with Nerofil (which forms a combustible filtercake) recovers metals values and process materials otherwise lost. Might it not do the same for you?

If you would like to investigate the possibility of cutting the invisible costs in your process water, an experienced Dicalite service engineer will be glad to discuss the problem with you and aid in working out the economics. No obligation, naturally.

Dicalite Bulletin BW-13 is available on request. While it deals primarily with potable water, its information is basic to the entire subject.

Dependable GLC GREAT LAKES Dicalite® FILTERAIDS

DICALITE DEPARTMENT, GREAT LAKES CARBON CORPORATION · 612 SO. FLOWER ST., LOS ANGELES 17, CALIF.

Check 2343 opposite last page.

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Industrial
Chemicals

...you're being served by

...a basic and integrated producer

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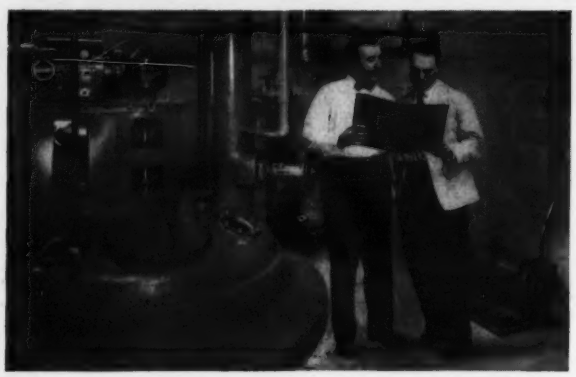

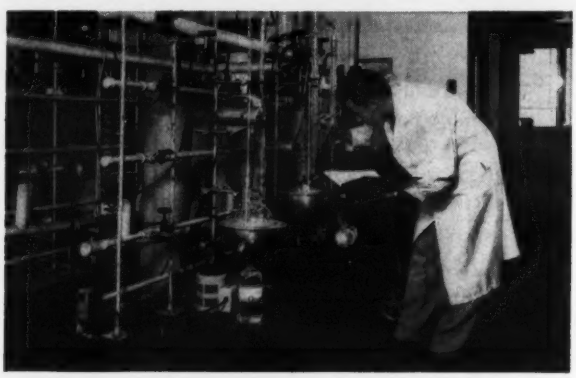

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Phenol • Sulphuric Acid • Phthalocyanines

COAL CHEMICALS • PLASTICIZERS • PROTECTIVE COATINGS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON • FERROMANGANESE

Check 2344 opposite last page.

Deep brown vat dyeing of cellulosic textiles aided by dyestuff

Fastness properties on rayon and cotton excellent

Uses: Vat dyestuff is a strong and economical component in production of deep chocolate browns, purplish grays, and other combination shades. It may be employed on materials that are to receive a resin finish.

Features: High level of fastness to light permits use of this dye in any proportion and as a shading component in combinations without impairment of light fastness.

Description: Indanthrene corinth B infra paste is a smooth, free-flowing, non-settling paste. It gives a bluish corinth shade described as a grayish, purplish red.

(Indanthrene corinth B infra paste is a product of General Dyestuff Company, Division of General Aniline & Film Corp., 435 Hudson St., New York 14, New York.)

Check 2345 opposite last page.

Cyclobutane derivatives now available

Two cyclobutane compounds have now been made available in development quantities. Tetramethyl-1, 3-cyclobutanedione and its reduction product 2,2,4,4-tetramethyl-1, 3-cyclobutanediol undergo reactions typical of acyclic ketones and secondary glycols.

Dione reacts readily to form oxime, cyanohydrin and other typical reactions of diketones.

Diol derivatives of greatest interest are esters and polyesters. They have shown exceptional thermo and hydrolytic stability in preliminary studies.

Both compounds are white crystalline solids. Dion melts at 115-116°C and diol at 125 to 135°C.

(Cyclobutane derivatives are supplied by Eastman Chemical Products, Inc., Subs. Eastman Kodak Company, Kingsport, Tennessee.)

Check 2346 opposite last page.

THAT'S INTERESTING

Putting out the fire

Science has come to the aid of professional auto racers on two fronts.

A shock-absorbent material developed by United States Rubber Company not only makes good padding for race car cockpits but provides a good measure of fire protection because it is self-extinguishing.

Material is made up of thousands of tiny isolated cells which prevents it from sponging up gasoline.

Brighter cars

The car of the future is destined to be more colorful through use of vacuum metallized plastic. It is expected that it will replace chrome-plated metal. Material can be colored to simulate gold or to match the hue of upholstery.

For more information on product at right, specify 2347 see information request blank opposite last page.

Which of these 3 products and services can you use from BECCO?

New Cold Caustic Bleach Process

Looking for a way to use greater amounts of low-cost, more plentiful pulp—without capital investment for bleach equipment? Then let a Becco Sales Engineer show you our new technique* which allows you to bleach in the same equipment regularly used for the manufacture of cold caustic pulp.

In this new process, peroxide bleach liquor is added at the Bauer Refiner, and bleaching occurs during the refining operation. Bleach response depends on refiner densities.

Up to 20 points brightness increase has been obtained in commercial operations to date, and with no additional steam costs, no holding time, and no excessive chemical costs.

Becco can assist you immediately in setting up a production run and evaluating results. First step: use the coupon to let us know you're interested.

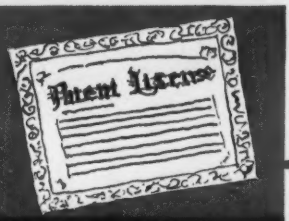
*—Patent Pending

BECCO fmc

BECCO CHEMICAL DIVISION, FMC
Station B, Buffalo, New York
Dept. CP-H

Gentlemen:
Please have a Sales Engineer give me more information on Becco's Cold Caustic Bleach Process.

NAME_____
FIRM_____
ADDRESS_____
CITY_____
ZONE____ STATE_____



"Enclosing $1.00 — Send Patent License"

Well, perhaps there's a little more to your gaining use of Becco patents than just mailing your dollar in, but not much more. And certainly, no more money. The $1.00 really does cover it.

Becco has lots of patents, granted as a result of innovations in the use of Hydrogen Peroxide and other Peroxygen chemicals developed in Becco's Research Laboratories. But they don't do us a whole lot of good locked tightly in our safe. So, we long ago adopted the following policy:

If one of our patents can help you, we'll be glad to license the rights to you **perpetually,** for just one dollar. You get a nice certificate, incidentally, to cover the legalities, but more important—you also get free our complete engineering help in setting up your process, handling the material, maintenance, etc., etc.

What do **we** get? You as a **customer**—we hope—but there's no obligation on your part. Just seems to work out that way, though—when we know enough about a particular peroxygen to hold a patent on its use, chances are we've also learned enough to produce it purer than anyone else. You benefit from this; we do, too.

Use the coupon below to ask for a Sales Engineer—or our list of patents—that may help you solve an important problem.

BECCO fmc

BECCO CHEMICAL DIVISION, FMC
Station B, Buffalo, New York
Dept. CP-F

Gentlemen:
Please send your list of patents available on the use of
☐ Hydrogen Peroxide
☐ Peroxygen Chemicals
☐ Persulfate Chemicals
☐ Please have a Sales Engineer call.

NAME_____
FIRM_____
ADDRESS_____
CITY_____
ZONE____ STATE_____

Problems in handling Hydrogen Peroxide

?

Becco's Four-Fold Engineering Service Program—offered free—includes:

1. Comprehensive survey of your facilities.
2. Specific proposal with recommendation of proved equipment and where it is obtainable.
3. Installation supervision by Becco.
4. Periodic inspection and permanent service.

Can you use this free Becco help, based on more years of experience with bulk handling of H_2O_2 than any other manufacturer? Use the coupon to let us know.

BECCO fmc

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Station B, Buffalo, New York
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Gentlemen:
Please tell me more about your Four-Fold Engineering Service.

NAME_____
FIRM_____
ADDRESS_____
CITY_____
ZONE____ STATE_____

Announcing

AICCO-SOL

MAGNESIUM SILICATE

New plant now producing highly adsorptive free-flowing powder

AICCO-SOL is a synthetic form of magnesium silicate with remarkable adsorptive powers, capable of de-odorizing and de-coloring liquids, and preventing caking of powders. It is a fine, white, free-flowing powder with porous structure and high surface-to-volume ratio.

AICCO-SOL is selective in its adsorptive powers, with strong affinity for acidic and polar materials, moisture vapor, gases, and color and odor-forming compounds.

Made in AICCO's new plant . . . an outgrowth of American Industrial Chemical Company's experience as a producer of silica gel, hydro gel, and other silicates. Samples and technical assistance gladly offered.

USES
- Removal of colors, odors, and impurities from solvents, oils, fats, waxes, and synthetic organic chemicals
- Curing plastics: prevention of blisters by absorbing vapor and gases released during molding
- Controlling thixotropy of plastic coatings
- Chromatographic adsorption in antibiotic and vitamin manufacture
- Retaining moisture, perfumes and flavors in powdered products.
- Preventing caking in plastic molding compounds, fertilizers, detergents, tooth powder, feed supplements, etc.
- Catalyst and catalyst carrier

PROPERTIES OF AICCO-SOL

Density, gm./cc.	2.04
Specific Area	600 sq.m./g.
Refractive Index	1.500-1.515
Pores: Volume	630 ml./g.
Avg. Dia.	33 A°
Distribution	Uniform
pH of 10% slurry	7.5-8.5

Reactions: Water adsorbed; no change in volume.
Weak acids removed by adsorption.
Strong acids dissolve it.
In salts, heavy metal ions displaced.
In bases, no reaction.

Write for data and samples

AMERICAN INDUSTRIAL CHEMICAL COMPANY
Div. of Amerace Corporation • Butler, N. J.

Check 2348 opposite last page.

Re-moistenable adhesive dries transparent and tack free

Uses: Product provides a re-moistenable adhesive surface for acetate or other plastics.

Features: Adhesive will dry to a transparent and tack free coating. When moistened with water, an aggressive tack immediately develops, making it possible to adhere acetate or plastic to glass, metal, wood, paper and other materials.

Description: Product is designated Re-Tac by manufacturer. It is a clear, water-white, re-moistenable adhesive.

(Re-Tac re-moistenable adhesive is a product of Adhesive Products Corporation, 1660 Boone Ave., New York 60, New York.)

Check 2349 opposite last page.

High specific volume and tensile strength mark polypropylene

No tendency to stress crack in polar materials

Uses: Polypropylene is recommended for injection-molded articles such as pipe fittings and valves, pump impellers or fan blades. Extruded mono-filaments can be fabricated into industrial fabrics and cordage. Heavy-gage sheeting can also be extruded for tank linings, fume hoods, duct work or pipe. Extruded profiles are being considered for gaskets and oil seals.

Features: Polypropylene offers the highest specific volume of any plastic now under commercial development. Yield strength and yield elongation for this product are excellent so far as tensile considerations are concerned. It demonstrates good surface hardness and abrasion resistance. Polypropylene is exceptionally inert and shows no tendency to stress crack in the presence of polar materials. Melting point is 335°F.

Description: In tests of chemical resistance, the following results were obtained after one week exposures: At 73°F acetone, methyl ethyl ketone, isopropyl alcohol, hexane, hydrochloric acid, nitric acid, sulfuric acid, and sodium hydroxide (40%) showed a negligible effect. Raising temperature to 150°F gave some slight reaction with acetone, methyl ethyl ketone, hexane, nitric acid and sulfuric acid.

MECHANICAL PROPERTIES OF ESCON POLYPROPYLENE AT 73°F.

YIELD STRENGTH, psi 2"/min.	5000
YIELD ELONGATION, % 2"/min.	15
IMPACT STRENGTH, ft.lb./in.	
IZOD NOTCHED	1
IZOD UNNOTCHED	16
STIFFNESS IN FLEXURE, psi	110,000

At this higher temperature polypropylene was not suitable for benzene and toluene.

Polypropylene exhibits the excellent electrical properties typical of all hydrocarbon polymers. It can be fabricated by any of techniques common to plastics industry.

(Condensed from a paper by C. E. Farnsworth and C. W. Virgin, Enjay Company, Inc., at the 57th Annual Meeting of the National Petroleum Association, Atlantic City, N. J.)

(For more information on Escon polypropylene contact The Enjay Company, Inc., 15 W. 51st St., New York 19, N. Y.)

Check 2350 opposite last page.

"Now calm yourself, Hitchcock, and tell me exactly what you said to the retort!"

NEW LITERATURE
Chemical Materials

Vinyl stabilizers and plasticizers are given comprehensive treatment in spiral-bound, indexed book. Coverage includes raw-material variables, applications and techniques, stabilizers, wetting and anti-block agents, plasticizers, brighteners and fungicides. Manual is designed for use of formulator in arriving at complete and suitable stabilizer system. Plastics Data Book—Advance Solvents & Chemical, Division of Carlisle Chemical Works, Inc., 500 Jersey Ave., New Brunswick, N.J.

Check 2351 opposite last page.

Vat dyestuff for deep chocolate browns is subject of eight-page circular which contains properties, use information and sample swatches. Bul G 806 — General Dyestuff Company, Division of General Aniline & Film Corporation, 435 Hudson St., New York 14, N. Y.

Check 2352 opposite last page.

Magnesium hydride is discussed in 16-page manual which includes sections on properties, reactions, uses, and handling precautions. Tech Bul — "Magnesium Hydride"—Technical Service and Development Department, The Dow Chemical Company, Midland, Michigan.

Check 2353 opposite last page.

Plastisols, organosols, and starting formulations for specific end uses are given in Nuodex Tech Bul—Nuodex Products Company, division of Heyden Newport Chemical Corporation, Elizabeth, N.J.

Check 2354 opposite last page.

Silicone potting material that permits visual and instrument checking of individual parts within potted assembly is introduced in four-page illustrated Bul 10-505—Dow Corning Corporation, Midland, Mich.

Check 2355 opposite last page.

Aliphatic organic chemicals are cataloged along with specifications and compositions in 10-page Aliphatic Organic Chemicals Cat—Armour Industrial Chemical Company, division of Armour & Company, 10 N. Wacker Dr., Chicago 6, Illinois.

Check 2356 opposite last page.

Radiochemical compounds are summarized in revised edition of Radiochemical Cat — Tracerlab, 1601 Trapelo Rd., Waltham 54, Massachusetts.

Check 2357 opposite last page.

Another new development using

B.F.Goodrich Chemical *raw materials*

1¼" diameter pipe of Geon rigid vinyl is being installed by Illinois Power Company in gas lines leading to homes at Decatur, Illinois. In addition, ¾" vinyl pipe is being inserted in reamed-out 1¼" iron pipe under streets to avoid breaking the pavement to repair leaking gas lines. Kraloy Plastic Pipe Company, Los Angeles, California, makes the pipe. B.F.Goodrich Chemical Company supplies the Geon rigid vinyl.

Now gas comes home through pipe of Geon

The pipe in this natural gas distribution system is made of Geon rigid vinyl. Years from now it will be feeding gas to homes just as efficiently as the day after installation. This pipe stays smooth inside and out because it is not affected by the corrosive influences that affect ordinary pipe. No problems from salt water, chemicals, acid or alkaline soils, or galvanic corrosion.

Conduit or pipe made of Geon provides high tensile and impact strength. It stands up under pressure, resisting effects of fungi, bacteria, moisture, heat or cold. It makes a big hit with installation crews, since it is so light weight and so easy to install.

Engineers are taking advantage of the properties of versatile Geon polyvinyl material for this and many other types of applications. For information, write Dept. AL-10, B. F. Goodrich Chemical Company, 3135 Euclid Ave., Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

B.F.Goodrich Chemical Company
a division of The B.F.Goodrich Company

B.F.Goodrich

GEON polyvinyl materials • HYCAR rubber and latex • GOOD-RITE chemicals and plasticizers

Check 2358 opposite last page.

IT'S NEW! Lapp

auto-pneumatic "MICROFLO" PULSAFEEDER

precise pumping at micro-flow rates
regulated by pneumatic control instruments

Here's a controlled-volume metering pump that will vary its microflow rate of output automatically to a changing process condition. Auto-Pneumatic Microflo Pulsafeeder is a piston-diaphragm pump with no stuffing box or other seal—it handles fluids without contamination or leakage.

Output of a standard Microflo is governed by controlling the travel of its piston. This is done manually through a micrometer. In the Auto-Pneumatic model, an air cylinder performs this operation. As a change in a process condition occurs, a pneumatic control instrument senses the change, records it and sends an air pressure signal descriptive of the changed condition. Auto-Pneumatic Microflo Pulsafeeder reads this air signal and changes its pumping rate accordingly.

Four models are available with flow rangeability of 10 to 1 and a flow range from 585 ML per hour maximum up to 1.2 gph maximum. Reagent head assembly is made from Carpenter No. 20 Stainless, Diaphragm is Kel-F and valves are Hastelloy C. Other materials are available on special order.

Lapp

WRITE FOR BULLETIN 500-A containing complete description and specifications on the new Auto-Pneumatic Microflo Pulsafeeder.
Lapp Insulator Co., Inc., Process Equipment Division, 3512 Poplar Street, Le Roy, New York.

Thickening latices with a carboxy vinyl polymer of extremely high molecular weight is explained in Carbopol Supplement 2—B. F. Goodrich Chemical Company, division of The B. F. Goodrich Company, 3135 Euclid Ave., Cleveland 15, Ohio.

Check 2360 opposite last page.

Ethylene oxide is comprehensively covered in 48-page manual. Data on physical and chemical properties, specifications, analytical procedures, and industrial uses are brought up to date. Ethylene Oxide Manual may be obtained by writing on your letterhead to Antara Chemicals, sales division of General Aniline & Film Corp., 435 Hudson St., N.Y. 14, N.Y.

Reagents for medical research and biochemical analysis are itemized in eight-page Dajac Directory—Dajac Laboratories, Borden Chemical Company, 5000 Langdon St., Box 9522, Philadelphia 24, Pennsylvania.

Check 2361 opposite last page.

Dielectric materials, including casting resins, foams, absorbers, adhesives, impregnants, coatings, ceramics, and reflectors, are concisely presented in Dielectric Materials Cat—Emerson & Cuming, Inc., Canton, Mass.

Check 2362 opposite last page.

Polyurethane rubber that is castable is described in eight-page Neothane Bul—Industrial Products Division, Goodyear Tire & Rubber Co., Akron 16, Ohio.

Check 2363 opposite last page.

Phthalates, both ditridecyl and didecyl, in high-temperature applications are summarized in Tech Bul 20—Chemicals Division, Enjay Company, Inc., 15 West 51st St., New York 19, N.Y.

Check 2364 opposite last page.

Teflon, molded into sheets, rods and tubes, is discussed in four-page Fact Sheet 3—Chemplast Inc., 3 Central Ave., Newark, N.J.

Check 2365 opposite last page.

Coloring agents for use with urethane foaming resin are cited in Rigithane 112 Bul — Thiokol Chemical Corporation, 780 N. Clinton Ave., Trenton 7, N.J.

Check 2366 opposite last page.

Synthetic mica—the story of its origin—is featured in inaugural issue of Mycalex News — Mycalex Corporation of America, 125 Clifton Blvd., Clifton, New Jersey.

Check 2367 opposite last page.

Check 2359 opposite last page.

Blending chart pertaining to oleum-sulfuric acid mixtures is available from Beacon Chemical Industries, Inc., 33-51 Richdale Ave., Cambridge 40, Mass.

Check 2368 opposite last page.

Industrial chemicals are itemized along with brief descriptions, physical data, uses and shipping information in 12-page bulletin. Chemicals manufactured by company's phosphorus division are cited in two-page supplement. Bul 100-C—Hooker Chemical Corporation, Box 344, Niagara Falls, N.Y.

Check 2369 opposite last page.

Chemicals, inorganic and organic, as well as culture media, stains, indicators, and volumetric solutions are inventoried in Cat C/7—Will Corporation, PO Box 1050, Rochester 3, N.Y.

Check 2370 opposite last page.

Molecular sieves that are chemical-loaded are described in series of seven technical bulletins covering properties and current uses. Bulletins available from New Products Department, Linde Company, Div. of Union Carbide Corporation, 30 East 42nd St., New York 17, N. Y.

Check 2371 opposite last page.

Emulsion polymerization of monomeric acrylic esters is subject of 18-page booklet. Methods of both redox and reflux emulsion polymerization, factors important to emulsion polymerization processes, plant equipment are among items discussed in Bul SP-154—Special Products Department, Rohm & Haas Company, Washington Square, Philadelphia 5, Pa.

Check 2372 opposite last page.

Mineral products, including physical and chemical characteristics of various grades, are cataloged in eight-page Mineral Products Cat—Minerals & Chemicals Corporation of America, Essex Turnpike, Menlo Park, N.J.

Check 2373 opposite last page.

Flavors and aromas are among items listed in 36-page Florasynth Cat — Florasynth Laboratories, Inc., 900 Van Nest Ave., New York 62, N.Y.

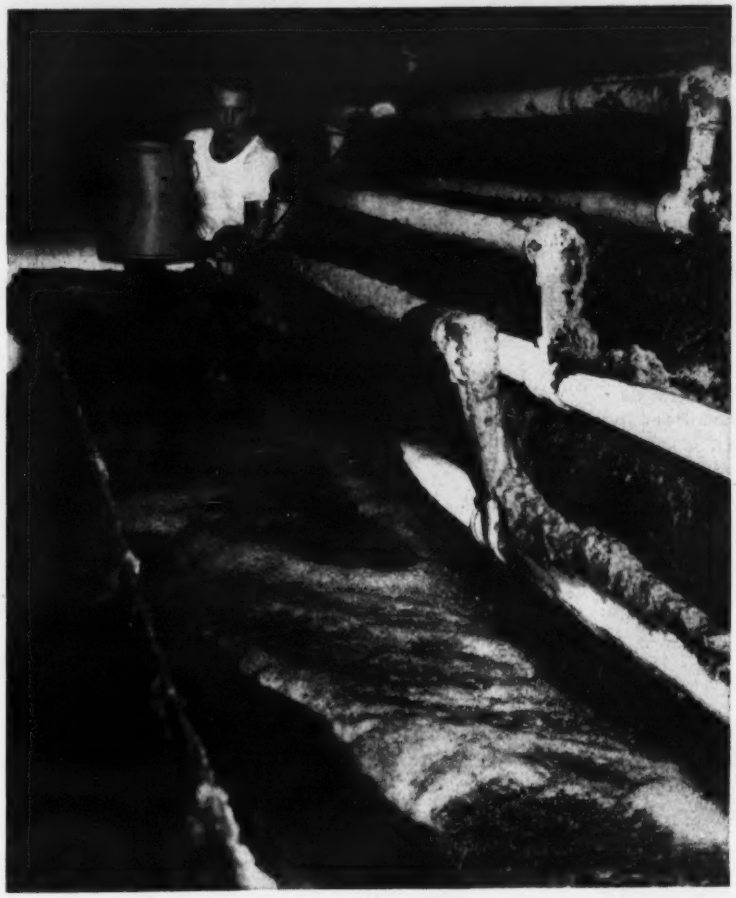
Check 2374 opposite last page.

Cellulose acetate for protective coating formulations is covered in 35-page brochure. Properties, solubility, and compatibility of various types are discussed. Bul E-105—Eastman Chemical Products, Inc., subsidiary of Eastman Kodak Co., Kingsport, Tenn.

Check 2375 opposite last page.

SILICONE NEWS from Dow Corning

Down Foam and Up Production



IN PACKAGE DYEING

No matter what you produce or process, you'll find Dow Corning silicone defoamers are economical; savings and production advantages are multiple. Prove this with your own tests using a generous trial sample that's yours for the asking. In writing for this free sample, please indicate your problem and mention the type of system—oil, aqueous, nonaqueous, food products, or any other. Address Dept. 3224 for a rapid reply.

Job-Proved Dow Corning Silicone Defoamers Save Time, Material, Money

Foam may be fine in a brewery. But in most processing plants, it's a sign of inefficiency. Foam reduces production capacity, slows processing, increases waste — can skyrocket your costs way out of proportion. But why accept foam as a necessary evil when Dow Corning silicone defoamers are so readily available to knock out "bubble trouble" . . . quickly, easily and economically?

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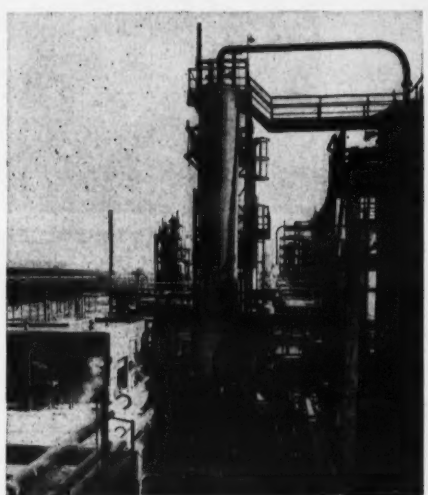

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Check 2376 opposite last page.

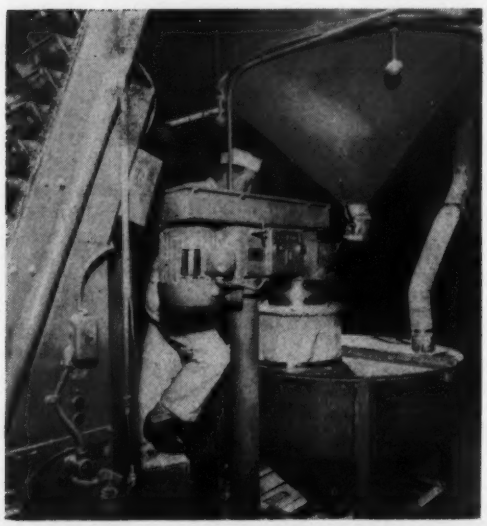
Closeup of stainless steel screen in whirling-rotor mill. Screen is in perfect condition after more than 10 months of operation

Grinding tons of abrasive aluminum hydroxide and magnesium trisilicate per day, whirling-rotor mills play key role in 'Gelusil' tablet plant. Saving hundreds of dollars a year, units . . .

• Slash screen replacement costs
• Up drying capacity 100%

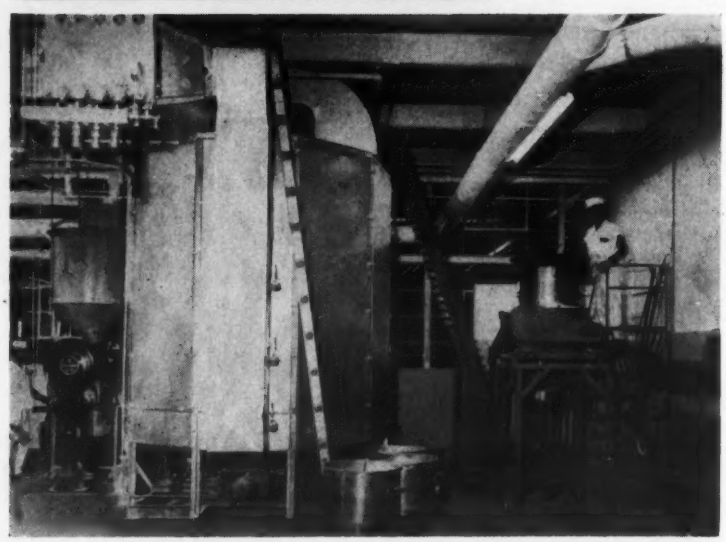
R. O. BUCHHOLTZ, Manager of Processing
Warner-Chilcott Laboratories, Morris Plains, New Jersey
with **CP STAFF**

Comparison of mixture before (left) and after (right) wet granulation. Improved particle size uniformity has cut drying time, increased dryer's capacity



Final granulation of ingredients takes place in this mill. Cloth sleeve surrounds perforated screen to catch fine particles

Overall view of grinding and drying area. Wet granulation is carried out in mill at right. Large unit in center is rotary-tray dryer. Final grinding is conducted in mill at left



PROBLEM: Screens on granulating equipment were wearing out about once per month at the Morris Plains, N. J. plant of Warner-Chilcott Laboratories (a division of Warner-Lambert Pharmaceutical Company). Used to process magnesium trisilicate and aluminum hydroxide mixture going into "Gelusil" antacid adsorbent tablets, the two mills were costing the company excessive downtime, maintenance, and expense.

Cause of trouble was abrasive nature of the ingredients plus mechanical rubbing action that occurred within the units. Cost of material and labor for replacing the stainless steel wire screens ran about $400 per year. Product contamination by frayed bits of screen wire was more expensive — amounting to approximately $800 per year in lost product, plus an impossible-to-estimate amount for labor involved in inspecting and scrapping the contaminated product.

Solution: Conventional mills were replaced with an efficient type of vertical-flow granulating and mixing machines. Units occupy only 3 x 6 ft floor space and feature whirling-blade rotor that throws material outward at high velocity against a 360° cylindrical mesh screen. Absence of mechanical rubbing action assures long screen life. As part of the overall granulating and drying system used in the process, the two mills permit continuous, automatic processing of several tons of material per day.

The first of the two units is used for wet-granulating. This distributes moisture evenly throughout the batch of material as it comes from the mixer. Mill also reduces size of large clumps in the wet mixture. Efficient dispersing action assures that all powdered material is wetted with granulating syrup and is converted into uniform size granules.

Wetting action also performs second function. It brings out certain desirable properties of the combination of aluminum hyroxide and

magnesium trisilicate that are only produced when they are thoroughly and intimately combined. These properties produce, in the final tablet, what Warner-Chilcott describes as "more pleasant chewing properties."

From the mill, the wet granulation is carried by bucket conveyor to top of 12 x 12 x 14 ft-high, rotary-tray, drying oven. As trays revolve, stationary arms at each level sweep the material through slots in tray bottoms so that it falls to next lower tray. Product gradually reaches bottom of unit, by which time it is thoroughly dry.

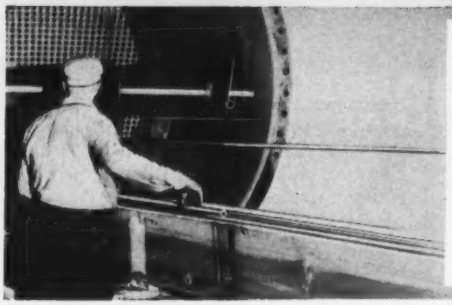
Dried material is picked up by another bucket conveyor and elevated to hopper feeding second mill. This unit dry-granulates product to final particle size of 20 mesh. Processed material contains only traces of fines and coarser particles. Largest is about 12 mesh. Next stop is blender, where product is mixed with peppermint-flavored oil prior to being sent to tablet compressing department.

Results: Excessive screen replacement, downtime, and maintenance have been checked. In operation for over 10 months, neither whirling-rotor mill has needed screen repair — a far cry from the once-a-month replacement required on previously used mills.

Drying capacity of rotary-tray dryer has been doubled. This is attributed to better moisture-dispersing action (in wet-granulating stage) and more uniform particle-size reduction achieved with the mills. It is estimated that the increased capacity has saved the company at least $35,000 in capital investment which would have been needed for an additional dryer.

Still another bonus has been reduced power consumption. Operating about 12 hours per day, the mills require 3 and 5 hp motors, compared to a total of 15 hp on old units.

Maintenance on the machines has been negligible. Parts coming into contact with product are made of stainless steel for corrosion



CONDENSER AND HEAT EXCHANGER CLINIC

Edited by A. W. Tracy, Metallurgical Engineer
The American Brass Company, Waterbury, Conn.

OPERATING FACTORS THAT AFFECT CONDENSER TUBE LIFE

Answers to some of the questions sent in following a previous clinic on this subject

Q. How effective is chlorination as a preventive maintenance procedure in cleaning tubes fouled by polluted water?

A. The chlorination of polluted sea water has been found to be effective in removing or preventing the formation of slimes on the walls of tubes. Better cleanliness was indicated by higher vacuum obtained on the steam side of the condenser. Tubes kept clean by chlorination have been reported to be less subject to pitting. It should be interjected here that tubes carrying polluted sea water containing sulfides from decomposition of organic matter seldom undergo inlet end corrosion, but the remainder of the length of the tubes often becomes pitted. Clean sea water, if entering the tube turbulently, will often cause corrosion at the inlet end, and usually the remainder of the length of the tube is coated with a good protective film of corrosion products.

The statement that chlorination may break down sulfide films on the walls of tubes is based on the fact that chlorine is an oxidizing agent and would oxidize sulfides; however, it is realized that the usual chlorine treatment would probably not remove thick long-standing sulfide scales.

Q. How often should tubes be cleaned and what are some of the methods used?

A. The required frequency of tube cleaning depends, of course, on how rapidly the tubes become fouled. In some power plants, tubes are cleaned once a week; at other stations, cleaning is required only at intervals of several months. Often the decision to clean tubes is determined by the drop in vacuum on the steam side.

In regard to methods for removing accumulations from condenser tubes, some station operators shoot rubber plugs through the tubes; others use bristle brushes, either of animal hair or nylon. The use of brushes is reported by some to do a better job of cleaning than the use of plugs.

An interesting method for continuously cleaning condenser tubes has been developed in Europe. A large number of sponge rubber balls, slightly larger in diameter than the inner diameter of the tubes and having about the same specific gravity as sea water, is fed continuously into the inlet water box. The cooling water forces the balls through the tubes, and deposits on the tube walls are swept away. The balls are collected by a cone in the outlet water box. They leave the water box through a tube connected to the end of the cone and are recirculated into the inlet water box. By the law of probability, each tube will eventually receive a ball. The system is not applicable to tubes that have been in service and have become rough and pitted.

Some stations periodically remove deposits from tubes by recirculating a dilute, inhibited hydrochloric acid solution through the condenser.

Q. How important are temperature and velocity as factors in the service life of condenser tubes?

A. Corrosion of condenser tubes is usually more rapid in summer than in the winter, but pollution due to bacterial action in the summer may be a more important factor than temperature itself. Instances have been observed where failures in a set of tubes occurred only in the warm-water months and none in the cold-water months, over a period of several years.

Mention was made in the clinic to the effect that high temperature of water causes pitting, due to the formation of gas bubbles on the tube wall. This type of pitting occurs most frequently, but not often, in oil refinery condensers where temperatures on the vapor side may be as high as 350F and water velocities relatively low. In a power plant condenser, temperatures on the vapor side ordinarily do not exceed 100F and temperature rise in the cooling water from the inlet to the outlet end is usually limited to 10F.

TECHNICAL ASSISTANCE. Our Metallurgical Department is regularly helping manufacturers, electric power companies, marine operators, petroleum and chemical companies to select the correct tube alloy for many types of condensers and heat exchangers. This service is available to you without obligation. Write: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario.

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Check 2378 opposite last page.

resistance and to minimize possibilities of contamination. All components are easily accessible and can be replaced in a matter of minutes. There are no special tools required.

In addition to the permanently mounted mills in the automated drying-and-granulating system, the plant has two other units mounted on casters. The mobile mills are rolled from department to department for variety of uses, including mixing, pulverizing, pulping, or chopping. Wet, sticky, and heat sensitive materials can be processed efficiently.

(Stokes Tornado mills are product of F. J. Stokes Corporation, 5500 Tabor Road, Philadelphia 20, Pa.)

Check 2379 opposite last page.

(N-22 rotary-tray dryer was manufactured by Wyssmont Company, Inc., 42-09 27th Street, Long Island City 1, New York.)

Check 2380 opposite last page.

NEXT MONTH

Do you know how to cool a proton accelerator? If not, then be sure to read the feature story in January CP's Idea section. Case in point: Brookhaven National Laboratories' giant three billion electron volt cosmotron.

Evaluate titanium uses in pulp-, paper-making

Program to develop and evaluate titanium and titanium-alloy products for pulp and paper processors is currently underway.

Titanium and alloys are already being used by processors for such purposes as chlorine dioxide reactors, scraper arms, pipe strapping, and other components where long service life in corrosive situations is necessary.

(Titanium development program is joint effort of product development and engineering departments of Mallory-Sharon Metals Corporation, Niles, Ohio.)

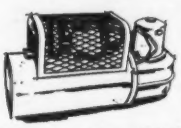
When you're choosing a protective coating...

HOW HOT IS YOUR HOT?

A Nose Cone Gets Hot

When conventional organic finishes were used in Chrysler Redstone Missile tests, they ignited and disintegrated under simulated re-entry conditions. Sicon survived because it possessed the inherent heat resistance to meet performance requirements. This has been confirmed in large scale tests and actual missile firings.

A Truck Heater Gets Hot



A porcelain type coating used on a truck heater failed because it could not stand the thermal shock of rapid heating and cooling. The same heating (550°-600°F.) and cooling left Sicon's film integrity unaffected.

A Tractor Engine Gets Hot

A farm equipment manufacturer used a bright organic red color on their standard equipment. The coating on the engine parts, which were subjected to high temperature, quickly decomposed. Midland engineers developed a matching bright Sicon Red which retained its color and gloss and protected the hot spots on the engine.

How HOT is your HOT?

Sicon possesses the flexibility of ordinary organic finishes and the heat resistance of ceramic coatings—up to 1000°F. in black or Aluminum; up to 550°-600°F. in decorative colors. Upon inquiry a sample Sicon formulation for testing your "hot" requirements will be prepared at no obligation. Send details of your "hot spot" problem today to Dept. L-28.

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Check 2381 opposite last page.

THAT'S INTERESTING

Trains 'sit' for portrait

Pictures now may be taken of moving trains as they speed through outlying sections and be flashed within seconds to a central office or freight yard.

Thus, before the train arrives at the yard, the picture shows car types and numbers which can be checked to keep each car heading toward its correct destination.

A study made at request of New York Central System shows information also could be used to plan make-up of new trains from arriving cars.

Wash-wear suede shoes

Warm soap suds and a brush with soft bristles are all that are needed to clean suede shoes—if they have been treated with a new leather protector. It's made by the Chemical Division of Minnesota Mining and Manufacturing Co. After washing, remaining soap is rinsed off with clean water.

liquid level automatically controlled

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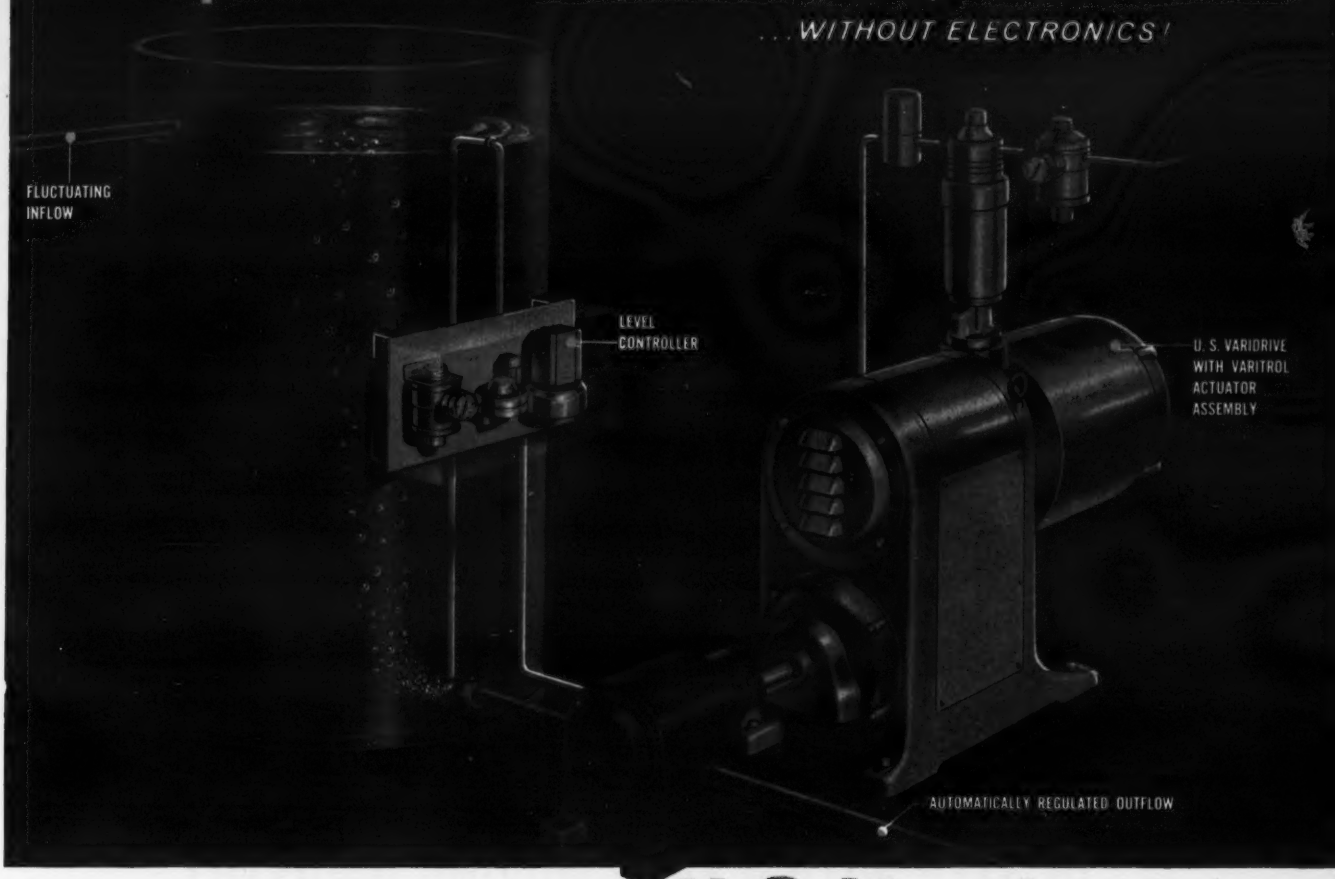

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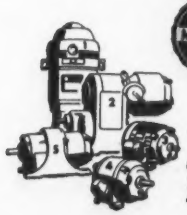

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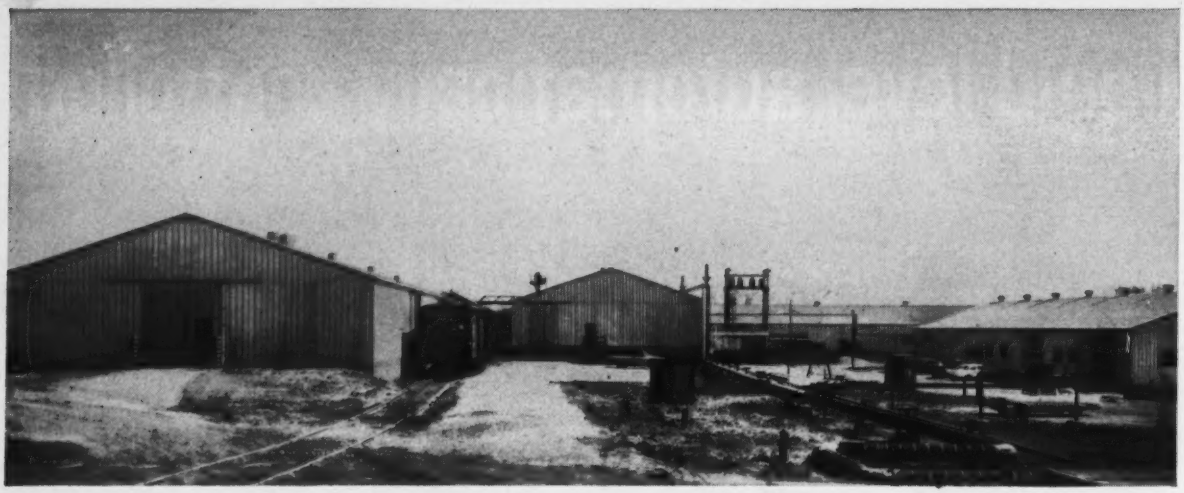

Four of the six Butler buildings used for the manufacture and storage of explosives at New Castle, Pa. by the Organic Chemicals Division of American Cyanamid Company.

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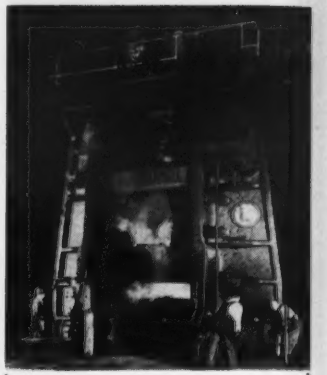

Impact of 100,000 tons . . .

. . . is produced by mammoth die forging hammer recently put into operation at Cudahy, Wis., plant of Ladish Co.

Utilizing counterblow principle in which two opposing rams are synchronized to strike forging blow, the giant 125,000-mkg hammer operates with octagonal or round closed impression dies up to 96″ and rectangular dies up to 72 × 200″. It has 96″ vertical stroke.

(Drop forge hammer was designed, constructed and installed by engineers and personnel of Ladish Co., Cudahy, Wis.)

Time assembling tubing reduced by one third, scrap losses cut

Armored-tubing assembling time has been cut one third at Minneapolis-Honeywell Regulator Company's Brown Instruments Division in Philadelphia, Pa., by utilizing extra-long lengths of capillary tubing with mechanical feeder.

Feeder inserts capillary lines into flexible metal hose (armored tubing) which protects lines from abuse. Lines are used in industrial pressure and temperature instruments.

Although feeder previously inserted lines into armored tubing more rapidly than could be done by hand, repeated time-consuming setups were

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U.S.I. CHEMICAL NEWS

★ A Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★

Ralph Knight Appointed U.S.I. Vice President

Ralph M. Knight, Manager of Polyolefin Planning for U.S.I., was recently appointed a Vice President. In his new position, Mr. Knight will intensify U.S.I's long-range polyolefin development program. He will continue to direct the Polymer Service Laboratory as well as to coordinate its efforts with other plastics activities within the company.

The newly created post is a reflection of the expanding role of polyolefin plastics in U.S.I.'s long-range growth plans. U.S.I. is currently the country's third largest producer of polyethylene, which it markets under the trade name PETROTHENE®. The company has underway an extensive expansion program which is expected to make it the second largest producer of polyethylene in the world by mid-1960.

Since joining the company in 1953, Mr. Knight has served as Polyethylene Manager, Polyethylene Production Manager, Assistant to the Vice President for Production, and Manager of Polyolefin Planning.

Chlorine Data Sheet Now Available from U.S.I.

Properties, shipping information and uses for liquid chlorine are detailed in a new data sheet just issued by U.S.I. Complete references for property data are included.

The material, which U.S.I. ships in 30-ton and 55-ton tankcars from Huntsville, Alabama, is used primarily in the bleaching of

MORE

Comprehensive Study Provides Data on Corrosion Resistance of Commercial Titanium-Base Alloys

Alloys Generally Corrode More Than Commercially Pure Titanium

An intensive research program to determine the corrosion resistance of seven of the most commonly used titanium alloys has recently been completed. Results indicate that in strong acids such as sulfuric and hydrochloric, the alloys generally have less corrosion resistance than commercially pure titanium itself. One exception—an alloy containing about 3% aluminum and 2.5% vanadium—has about the same degree of corrosion resistance as the unalloyed metal.

All seven alloys are reported to be completely resistant to solutions of ferric chloride, sodium chloride and sodium hydroxide and, with very few exceptions, to formic acid—under test conditions. Test results in aluminum chloride solutions were very erratic. However, they do indicate that under some conditions, these solutions can attack both titanium and its alloys very severely. In oxalic acid, all alloys corrode excessively.

The program revealed that polished surfaces are more corrosion resistant than pickled-finish surfaces, and that a high dissolved oxygen content in acid solutions slows corrosive action on both the metal and its alloys. The alloys tested, and their chemical analyses, are shown in table 2.

They were immersed for 336 hours in the following corrodents at 95°F. and/or 190°F.: 1, 3 and 5% hydrochloric acid, 5% sulfuric acid, 5% oxalic acid, 25% formic acid, 25% aluminum chloride, 25% ferric chloride, saturated sodium chloride and 25% sodium hydroxide. Studies were made without agitation of the corrosive solution, with air agita-

MORE

Methionine Indicated for Schizophrenia Treatment

Russian researchers have made a preliminary study which indicates that the sulfur amino acid, methionine, has a therapeutic effect in the treatment of schizophrenics. The treatment seems to give best results in the early stages of the illness.

The study was made with 20 patients, eight of whom had been ill for only a short time, with the disease in an acute form. The others had been afflicted for a long period. Methionine treatment was beneficial and helped normalize conditional and absolute reflex activity. In some cases the return of normal vascular reflexes preceded clinical improvements. Blood studies showed sharp changes in the index of thymol reaction and glutamine content of the serum after methionine treatment. The researchers analyzed the urine of the patients and confirmed improved nitrogen metabolism when methionine was administered.

It was noticed that patients become more communicative after treatment. Their appetite and sleep improved, along with their ability to take care of themselves. Psychopathological symptoms leveled off.

TABLE I.

ALLOY	CORROSION RATES, mpy														
	190°F NO AGITATION					95°F AIR AGITATION					95°F N_2 AGITATION				
	1% HCl	3% HCl	5% H_2SO_4	5% Oxalic	25% Formic **	3% HCl	5% HCl	5% H_2SO_4	5% Oxalic	25% Formic **	3% HCl	5% HCl	5% H_2SO_4	5% Oxalic	25% Formic **
Comm. Pure Ti— 75 BHN	0.10	142	452	—	E	0.07	*	55.6	—	E	4.9	16.1	16.4	—	E
Comm. Pure Ti—120 BHN	3.3	140	254	1158	E	0.17	*	*	38.4	E	5.2	8.2	20.0	52.0	E
Comm. Pure Ti—180 BHN	0.17	196	571	705	E	0.03	*	9.96	20.7	E	5.1	10.4	17.5	32.7	E
Comm. Pure Ti—200 BHN	0.10	216	560	801	E	0.07	*	8.4	14.0	E	6.4	11.1	31.1	32.7	E
MST 8 Mn, Annealed	0.29	233	877	588	E	0.13	28.6	17.0	47.9	E	9.24	17.9	41.9	82.7	5
MST 6 Al–4V, Annealed	59.5	357	872	1582	164	1.35	31.8	44.8	41.9	E	12.4	18.7	32.4	42.8	5
MST 6 Al–4V, Age Hardened	49.4	378	850	983	164	4.05	26.6	26.9	25.7	E	7.97	16.2	29.8	61.9	5
MST 5 Al–2.5 Sn, Annealed	83.2	588	1230	1877	E	13.7	36.6	43.7	57.1	E	22.8	38.5	52.9	43.4	E
MST 821, Annealed	1.46	313	646	1418	E	0.46	14.7	37.2	54.4	E	9.85	16.6	23.7	62.2	E
MST 2.5 Al–16V, Solution Treated	3.4	160	591	561	50	0.49	5.2	0.65	23.8	E	5.47	9.8	21.4	20.2	E
MST 2.5 Al–16V, Age Hardened	3.7	211	660	988	50	0.23	14.2	24.0	22.6	E	9.11	17.6	38.0	20.6	E
MST 185, Annealed	37	430	888	582	E	0.06	*	*	21.8	E	12.9	19.8	43.5	19.0	E
MST 185, Age Hardened	74	450	946	1039	E	0.33	*	*	33.5	E	14.6	22.3	45.5	40.3	E
MST 3 Al–2.5V, Annealed	0.30	147	667	1028	E	0.10	0.05	*	23.1	E	5.01	7.43	16.4	24.8	E

* results erratic ** no tabular data except as shown. E indicates complete resistance.

★ U.S.I. CHEMICAL NEWS ★

CONTINUED

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pulp and paper, in the manufacture of chlorinated solvents, in making plastics, resins, automotive fluids, insecticides, herbicides, refrigerants, propellants, and in water and sewage treatment.

The data sheet can be obtained from U.S.I. sales offices or from the Chlorine and Caustic Soda Sales Department, 99 Park Avenue, New York.

Have you a new product to tell the world about?

Make it routine to send your publicity releases to the Editor, U.S.I. Chemical News, often called the "Front Page of the Chemical Process Industries."

CONTINUED

Titanium Alloys

tion and with nitrogen agitation.

Actual corrosion rates in mils per year (mpy) are shown in table 1. The following ratings permit interpretation of these mil-per-year figures:

Corrosion rate, mpy	*Rating*
less than 0.5	Excellent
0.5 to 5.0	Good
5.0 to 10.0	Fair
more than 10.0	Poor

The alloys rated about as follows in the tests, starting with the most highly corrosion resistant:

(1) MST 3A1-2.5V
(2) MST 2.5A1-16V
(3) MST 8A1-2Cb-1Ta (821)
(4) MST 1A1-8V-5Fe (185), MST 8 Mn, MST 6A1-4V
(5) MST 5A1-2.5Sn

New Synthetic Ketone With Fresh, Leafy Odor Gives Soap Perfumer New Tool

A new synthetic aromatic ketone, related in activity to a group of trace constituents of essential oils, has recently been discovered and found to possess the soap-scenting effectiveness usually associated with natural materials. Thus the new synthetic material is reported to give the perfumer a new tool for achieving lasting, strong, stable and fragrant soap perfumes with increasing independence from the essential oils.

Although the characteristic, fresh, leafy note of the ketone is not new—an almost identical note being found in petitgrain oil—the new ketone is said to offer many possibilities for original perfumes not possible with petitgrain oil itself. This because it is a concentrated note free from terpene and other ester components that would hamper its adaptability. The material is offered for use by the soap perfumer in petitgrain, bergamot, lavender, vetiver, lemon, neroli and geranium type compositions.

Tests were performed with the new ketone in soap bars and powders, and liquid and powdered detergents. In all cases, the material was reported to give a strong fragrance which lasted, unchanged as to strength and character, through accelerated aging tests.

When incorporated into soap bouquets, the ketone is reported to contribute these advantages to soap cake fragrance: cakes retained their fresh note long after identical cakes without the ketone became flat and lifeless; cakes gave a more diffusive fragrance than identical cakes without the ketone; cakes containing the ketone were judged to have a more refreshing and exhilarating scent.

TABLE 2: CHEMICAL ANALYSES OF TITANIUM ALLOYS USED IN CORROSION TESTS

ALLOY	% O_2	% N_2	% C	% H_2	% Fe	% Al	% V	% Mn	% Cb	% Ta	% Sn
MST 8Mn	0.097	0.01	0.04	0.0082	0.13	..	..	8.2	..	..	..
MST 6Al-4V	0.059	0.011	0.04	0.0031	0.20	6.27	4.21	..	..	..	..
MST 5Al-2.5Sn	0.142	0.02	0.02	0.0032	0.19	5.00	..	..	..	..	1.90
MST 821	0.101	0.015	0.02	0.0062	0.25	7.96	..	..	2.25	1.01	..
MST 2.5Al-16V	0.093	0.015	0.04	0.0130	0.20	2.85	15.94	..	..	..	..
MST 185	..	0.004	0.02	0.0084	5.09	1.76	7.28	..	..	..	..
MST 3Al-2.5V	0.120	0.011	0.06	0.0020	0.17	2.91	2.45	..	..	..	..

TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U.S.I.

Glycerine properties, reactions, performance are covered in new 20-page booklet now available. Describes all commercial grades and types; includes information on storage, shipping, handling; covers variety of known uses. **No. 1530**

Pilot scale versions of two commercial continuous centrifuges can now be obtained for clarifying, separating and concentrating in lab and pilot plant. One unit is for liquids with up to 20% solids, the other for up to 5% solids. **No. 1531**

Montmorillonite catalysts, made from bentonite and aluminum hydrosilicate and used mainly in reactions otherwise catalyzed with hydrogen acids, are now marketed in U.S. Characterized by highly selective catalytic activity. **No. 1532**

New type applicator for ether aerosol diesel starting fluid has been developed. Holds standard aerosol can and feeds fluid into intake manifold of engine through closed system. Said to give quick start without fluid waste of vapor escape. Is compact, fits any engine. **No. 1533**

New guide for fire and explosion prevention in plants producing and handling zirconium can now be purchased. Pamphlet outlines safeguards for fire prevention, dust collection, fire protection, and disposal of waste materials. **No. 1534**

Skin lotion to keep hands free from drying by solvents has been developed for use by chemists and clinicians working with acetone, methanol, ether, alcohol, xylene, benzene, chloroform, detergents, alkalis, etc. **No. 1535**

New facepiece for gas and hose masks, air line respirators, demand breathing apparatus, is now on market. Features easily replaceable, large single lens, improved speaking diaphragm, built-in accommodation for glasses, no logging. **No. 1536**

Acid inhibitor has been made odorless, without changing inhibiting properties of product. Material is added in small amounts to acid pickling solutions to prevent attack of steel and copper, and reduce rust during steel drying. **No. 1537**

Laboratory production and use of sodium wire are outlined in new technical data sheet. Includes photo, diagrams, complete description of equipment; extrusion method; typical reaction of the wire in Bouveault-Blanc reduction. **No. 1538**

New Product for poison ivy treatment is said to act quickly by neutralizing ivy phenols which cause rash and itch. Works on ion exchange principle to convert toxic phenolic compounds to inactive phenolates. **No. 1539**

PRODUCTS OF U.S.I.

Alcohols: Ethyl (pure and all denatured formulas); Anhydrous and Regular Proprietary Denatured Alcohol Solvents SOLOX®, FILMEX®, ANSOL®M, ANSOL PR.

Organic Solvents and Intermediates: Normal Butyl Alcohol, Amyl Alcohol, Fusel Oil, Ethyl Acetate, Normal Butyl Acetate, Diethyl Carbonate, DIATOL®, Diethyl Oxalate, Ethyl Ether, Acetone, Acetoacetanilide, Acetoacet-Ortho-Chloranilide, Acetoacet-Ortho-Toluidide, Ethyl Acetoacetate, Ethyl Benzoylacetate, Ethyl Chloroformate, Ethylene, Ethyl Sodium Oxalacetate, Sodium Ethylate, Urethan U.S.P. (Ethyl Carbamate), Riboflavin U.S.P.

Pharmaceutical Products: DL-Methionine, N-Acetyl-DL-Methionine, Urethan USP, Intermediates.

Heavy Chemicals: Anhydrous Ammonia, Ammonium Nitrate, Nitric Acid, Nitrogen Fertilizer Solutions, Phosphatic Fertilizer Solution, Sulfuric Acid, Caustic Soda, Chlorine, Metallic Sodium, Sodium Peroxide.

PETROTHENE® ... Polyethylene Resins

Animal Feed Products: DL-Methionine, MOREA® Premix (to authorized mixer-distributors).

U.S.I. INDUSTRIAL CHEMICALS CO.
Division of National Distillers and Chemical Corporation
99 Park Avenue, New York 16, N. Y.

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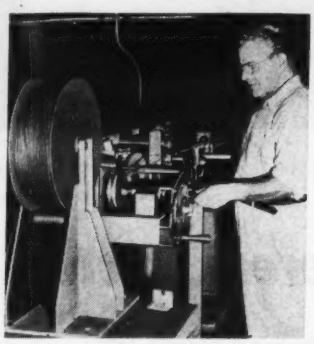
required due to relatively short lengths available in capillary tubing.

The difficulties were overcome by purchasing capillary tubing in lengths up to 3000 feet mounted on reels which can be placed on feeder. Armored tubing, of same length as needed in finished capillary assembly, is suspended just below ceiling in taut line beginning at feeder. Capillary



Capillary tubing is fed from reels on this machine into armored tubing suspended from ceiling

tubing is fed into armored hose by turning crank which unwinds reel.

Machine automatically measures tubing as it pays it out. This enables operator to plan assembly and reduce scrap.

(Capillary tubing in extra-long lengths is product of Superior Tube Company, Norristown, Pennsylvania.)

Check 2384 opposite last page.

Wasteful cutting . . .

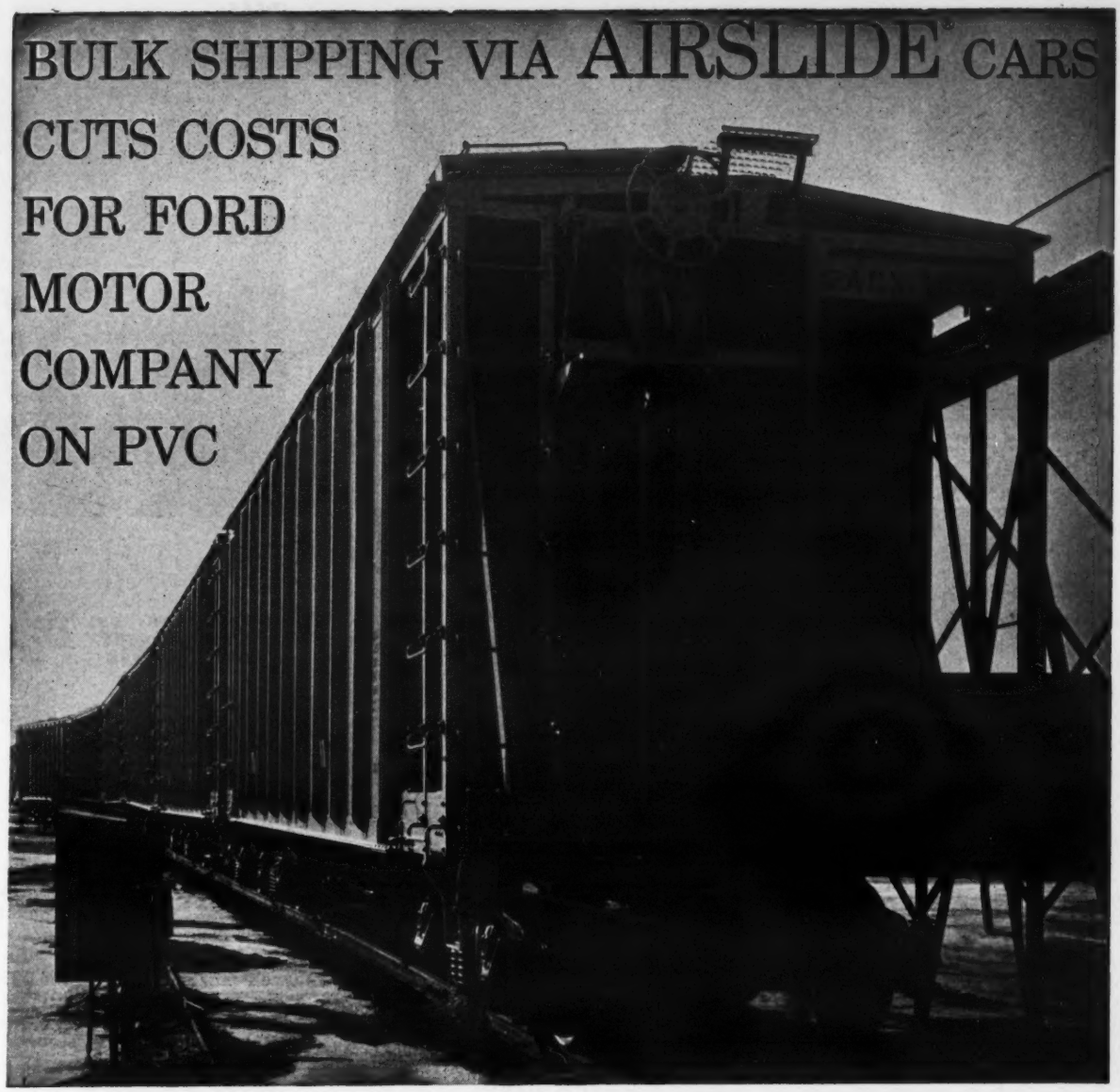
. . . of urethane foam is eliminated with one-shot process which permits molding of material into desired shapes.

Resultant savings from waste prevention—estimated 25 to 30%—are expected to cut urethane foam prices.

(One-shot process is development of National Aniline Division, Allied Chemical Corp., 40 Rector St., N.Y. 6, N.Y.)

For more information on product at left, specify 2385 . . . see information request blank opposite last page.

BULK SHIPPING VIA AIRSLIDE CARS CUTS COSTS FOR FORD MOTOR COMPANY ON PVC



Producing a better car for the least possible money is a constant challenge to auto manufacturers. To help solve this problem the Ford Motor Company is cutting costs of transporting PVC resin by bulk shipping in Airslide cars.

As a result, Ford not only gets substantial savings, but receives the PVC without in-transit contamination.

The Airslide car is filled by blowing the resin through one of the top hatches of the car. At the unloading point, low pressure air is used to aerate the PVC and cause it to discharge by gravity. The product is then taken under vacuum through a pipe to storage bins.

If you ship or receive dry granular chemicals in bulk, investigate the advantages of shipping via Airslide car. You'll find *it pays to plan with General American.*

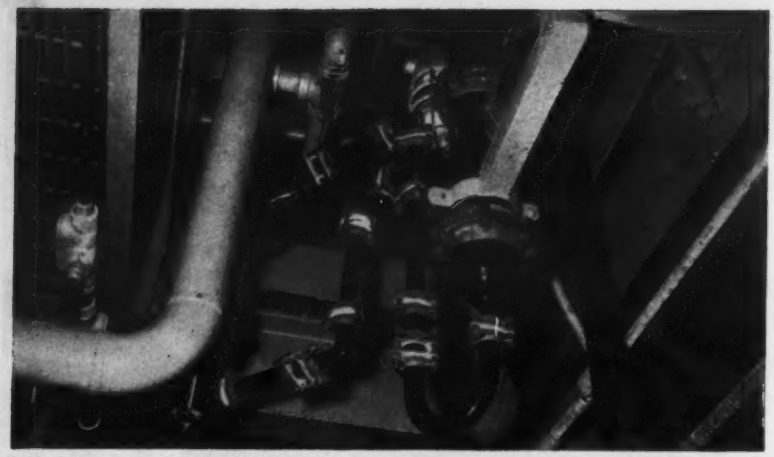
Airslide and Dry-Flo Car Division

GENERAL AMERICAN TRANSPORTATION CORPORATION

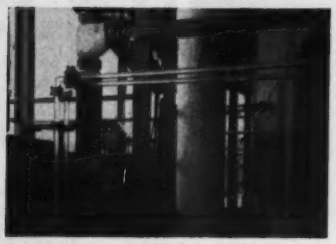
135 South LaSalle Street • Chicago 3, Illinois
In Canada: Canadian General Transit Co., Ltd., Montreal

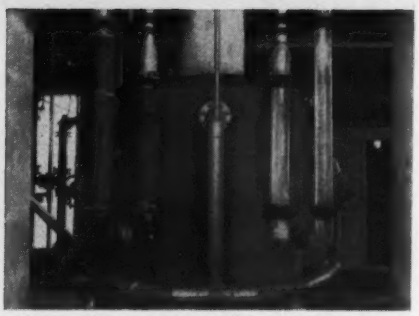
AIRSLIDE GENERAL AMERICAN TRADE MARK

Check 2386 opposite last page.



1. No danger of corrosion or product contamination, even with highly reactive processes, when you use PYREX Pipe. That's why you'll find PYREX Pipe handling pure bromine in Michigan Chemical's plant at El Dorado, Arkansas.





2. You can use PYREX Pipe outdoors, too, even where ambient temperatures differ widely from those of fluids handled. 3. You can keep constant visual check on flow because PYREX Pipe is transparent. This lets you see blockage, or other problems, before extensive damage is done.

A lot of bromine means a lot of glass

Michigan Chemical depends upon PYREX® Pipe to safeguard its bromine output

You would hardly attempt to make bromine in the laboratory in anything but glass—and probably glass bearing the PYREX trademark.

Naturally enough, when Michigan Chemical Corporation built its new El Dorado, Arkansas, plant, in cooperation with the Murphy Corporation, a lot of PYREX Pipe footage was installed.

Much of the glass pipe is used to deliver bromine from the Kubierschky extraction towers. The rest is used to handle hot acidified brine and ethylene bromide.

If you have ever had anything to do with the manufacture of bromine —or with any such corrosive process— you know what Mr. Clayton Carter, Plant Manager, means when he says, "PYREX Pipe is one of the few materials we have found that will withstand the extreme corrosion."

Not only is PYREX Pipe easy to keep in service—even under these rugged conditions—it is easy to *put* in service.

Your Own Men Can Install PYREX Pipe

PYREX Pipe is no more difficult to install than any other piping. For one thing, it's lighter, easier to handle, takes fewer hangers. There are no expansion joints, no lead pouring. All that is needed is a wrench and a good strong right arm. It doesn't have to be babied.

And PYREX Pipe Costs Less

PYREX Pipe is rugged. It's chemically inert. It withstands extremes of thermal shock. Add these up and you have the reasons a PYREX Pipe installation costs so little—*just because it lasts so long.*

Get the Facts

The best way to get the facts about what PYREX Pipe can do for you is to try it out yourself in your plant. Just ask us about making a test installation.

For all the facts on application, design, and installation, send for a free copy of Bulletin PE-3. Just write to Corning Glass Works, 3 Crystal Street, Corning, New York.

CORNING GLASS WORKS

CORNING MEANS RESEARCH IN GLASS

Check 2387 opposite last page.

Fuel-Cell Powered Tractor

Direct conversion of chemical energy into electricity drives experimental vehicle

Proving that progress is being made in the development of larger and more efficient fuels cells, Allis-Chalmers recently demonstrated a fuel cell-powered tractor. The 5270 lb experimental vehicle is operated by electricity generated within 1008 cells.

Cells are joined in 112 units of nine cells each. A mixture of gases — primarily propane — and oxygen fuels the ¼" thick, 12" sq cells which develop a total of 15 kw DC electricity. The tractor, equipped with headlights and even a radio, operates smoothly and silently. It attains 3000 lb of drawbar pull, more than enough to pull a multiple-bottom plow.

The vehicle carries its gas supply in tanks. It can operate more than 15 minutes on two lb of fuel. Gases are fed through a system of tubes into the cells. Once in cells, gases react with each other in an electrolyte to form mainly carbon dioxide and water. Reaction results in transfer of electrons, which is of course an electric current.

Reaction proceeds rapidly at room temperature. A catalyst coating the electrodes of each cell helps speed the reaction. No information has been released as to the exact composition of the electrolyte or the catalyst.

Concentrated solutions of sodium or potassium hydroxide have served as electrolytes in other fuel cell experiments. Fine particles of platinum, palladium, and silver have been used as catalysts.

The DC current generated in the cells flows through an external circuit which is connected by bus bar to a conventional 8 x 11 x 21" controller. Speed and direction of tractor are regulated by controlling amount of current reaching 20-hp motor driving the wheels.

Because the fuel cell does not release heat but converts chemical energy directly into electrical energy, it escapes high heat engine energy losses. Conversion efficiency in theory can approach 100%. Energy conversion efficiencies close to 75% have been obtained —

which is considerably higher than the 40% achieved with today's best diesel engines.

In theory, fuel cells can supply electric power as long as the fuel supply lasts. Up to now, fuel cell performance left much to be desired because of difficulties associated chiefly with unfavorable chemical reaction rates.

(Further information about fuel cells may be obtained by writing to Allis-Chalmers Manufacturing Company, Milwaukee, Wisconsin.)

Savings of $24,000/year expected by adopting condensate recovery

Power station to attain high thermal efficiency

Thermal efficiency and lower maintenance costs are anticipated through the use of condensate scavenging at Little Gypsy station of Louisiana Power & Light Company.

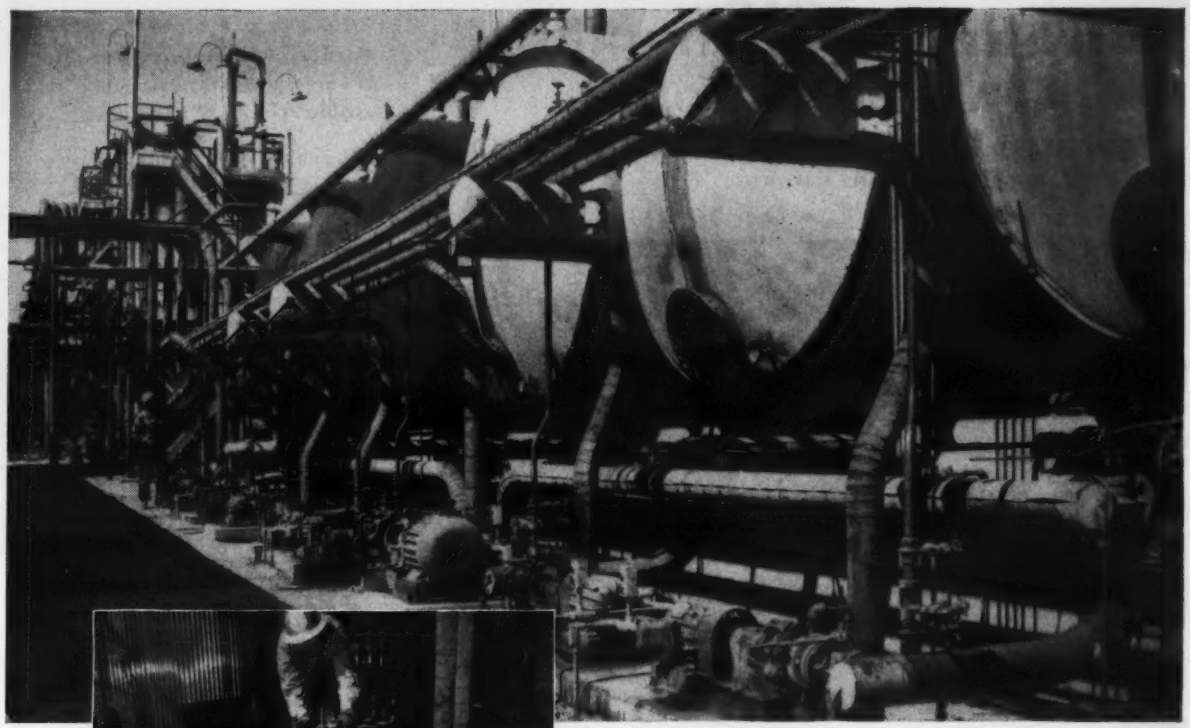
Believed to be first station with drum-type boilers to use this method of central-station water treatment, Little Gypsy will be gas-fired, 230,000-kw power-generating station which will operate at 2400 psig and 1000° F.

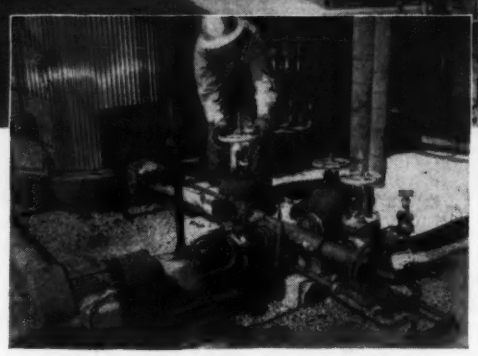
Condensate-scavenging equipment will consist of three mixed-bed demineralizers and two leaf-type condensate filters. By using the scavenging method, Little Gypsy will utilize a two-bed demineralizer for makeup, instead of mixed-bed unit. Mixed-bed units will be designed for external regeneration.

Although treatment costs over 12-year period will be $53,900 as compared to $43,800 for system without condensate scavenging, savings of $24,300 a year are expected to accrue from overall thermal efficiency gain and other operating efficiencies.

(Condensate scavenging systems are development of Graver Water Conditioning Co., division of Union Tank Car Company, 216 W. 14th St., New York 11, N. Y.)

Check 2388 opposite last page.





La Bour Pumps Make Good on Another Kind of Tough Job

Most of the tasks assigned to La Bour Pumps involve corrosive liquids, suction conditions aggravated by vapors or gases, or solid particles such as crystals or dirt. Sometimes all three appear in one application. But here's a job with none of these problems, yet it took the unique design and capabilities of La Bour to provide a satisfactory solution.

There are 32 La Bour Type DZT pumps now at work at Bareco Wax Company, Barnsdall, Okla., and 12 others are in process of installation there. They move wax, at temperatures above 200° F., through all stages of manufacture. Pumps and lines are steam-jacketed throughout.

Whatever your problem in handling process liquids, corrosive or otherwise, it will pay you to get in touch with La Bour.

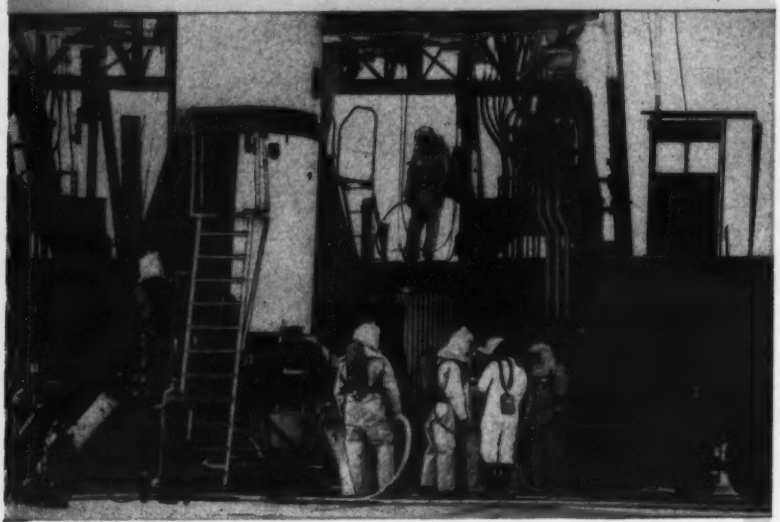
ORIGINAL MANUFACTURERS OF THE SELF PRIMING CENTRIFUGAL PUMP

LABOUR

THE LaBOUR COMPANY, INC. • ELKHART, INDIANA, U. S. A.

Check 2389 opposite last page.

WHEREVER **BIG** THINGS
ARE BEING DONE
IN MILITARY ESTABLISHMENTS THROUGHOUT THE WORLD
(AND ELSEWHERE)



YOU WILL FIND
Scott
AIR-PAKS
The World's Finest Protective Breathing Equipment

SINCE 1932 Scott FOR SAFETY—FOR SERVICE

SAFETY EQUIPMENT DIVISION
SCOTT AVIATION CORPORATION
242 ERIE STREET, LANCASTER, N. Y.
Canada: Safety Supply Co., Toronto — Branches in Principal Cities
Export: Southern Oxygen Co., 250 West 57th Street, New York 19, N. Y.

SCOTT ALSO MANUFACTURES HIGH ALTITUDE OXYGEN EQUIPMENT FOR MILITARY EMERGENCY ESCAPE SYSTEMS AND OXYGEN EQUIPMENT FOR CIVIL AVIATION INCLUDING THE WORLD'S LEADING AIRLINES

Check 2390 opposite last page.

Porous nickel fabricated in variety of shapes, usable to 575°F

Capable of operating at temperatures to 575°F, a pressed and sintered porous nickel is being produced in large and intricate shapes.

Hydrostatic pressing process makes possible fabrication of sheets 12 by 30", and cylinders 12" in diameter and 24" long. Unusual shapes can be produced; and holes, projections and indentations formed.

Variety of contours possible with porous nickel processed by hydrostatic pressing

Composed of 99+ % nickel, maximum yield strength is 10,000 psi. Pore-diameter range is 1 to 45 microns, and maximum thickness is 1".

PROPERTIES (2-micron pore size)	
Coef. of linear expansion, cm/cm/°C	9.7×10^{6}
Ultimate tensile strength, psi	8116
Yield strength, psi	8120
Mod. of elasticity	6.84×10^{6}
Density, lb/cu in	0.253
Air flow at 15 psi for ¼"-thick material, unmachined, cfm/ft²	5.5
Porosity, %	21.4

Material can be used as noncontacting conveyor when processing extrasensitive materials, adhesive materials, plastics and products having high surface sensitivity at high temperatures.

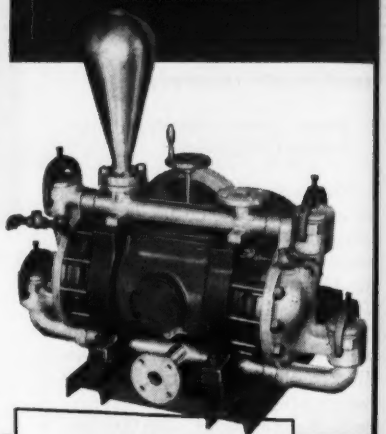
In glass industry, material is used as noncontacting chute, molten glass being carried on cushion of air forced through pores.

(Cormet A is development of Corning Glass Works, Corning, N.Y.)

Check 2391 opposite last page.

for those
hard-to-handle fluids

- CORROSIVE
- ABRASIVE
- VISCOUS
- THICK
- HEAVY
- QUICK SETTLING
- VALUABLE
- SENSITIVE
- HAZARDOUS



SHRIVER DIAPHRAGM PUMP

- LOW OPERATING COST
- LOW MAINTENANCE COST
- LONGER SERVICE LIFE
- EASY TO CLEAN

Thousands of Shriver pumps handling materials that clog or wear out other pumps all too quickly have proved their amazing service economy record. It will pay you to get Bulletin 148.

T. SHRIVER & CO., Inc.
846 Hamilton St., Harrison, N. J.

Check 2392 opposite last page.

NEW LITERATURE

Ideas and new trends

How two-bed demineralizer solved water treating problem in public utility power plant is outlined in technical paper Reprint-121 — Cochrane Corp., 17th St. Below Allegheny, Philadelphia 32, Pa.

Check 2393 opposite last page.

Air sampling techniques are discussed in four-page booklet. Several methods of determining amount and size of distribution of airborne dusts are listed. "Air Sampling Techniques" — Gelman Instrument Company, P. O. Box 86, Chelsea, Michigan.

Check 2394 opposite last page.

U-235 shipment guide has been published by AEC. The 75-page guide, TID-7019, may be obtained at $1.00 per copy from the offices of technical services, Dept. of Commerce, Washington 25, D.C.

Activated bauxite's use as catalyst for recovery of 99.77% pure sulfur from H_2S is introduced in four-page "Sulfur from H_2S"— Porocel Corporation, subsidiary of Minerals & Chemicals Corporation of America, Essex Turnpike, Menlo Park, N. J.

Check 2395 opposite last page.

Custom production facilities manufacturer has for biochemical purposes are described in eight-page brochure. Unit processes, equipment, and laboratories are listed and depicted in Custom Production Facilities Bul—Commercial Solvents Corporation, 260 Madison Ave., New York 16, N. Y.

Check 2396 opposite last page.

Control of water problems in air conditioning systems is discussed in four-page bulletin. Suggestions are listed for stopping scale formation, slime, and algae growths. Bul 596 — Betz Laboratories, Inc., Gillingham & Worth Streets, Philadelphia 24, Pa.

Check 2397 opposite last page.

MEK wax plant is toured in eight-page brochure. Flow chart, description, and photographs of process are included. MEK wax plant literature—Badger Mfg. Co., 230 Bent St., Cambridge, Mass.

Check 2398 opposite last page.

Research projects conducted during last year at Midwest Research Institute are reviewed in 26-page book. The 14th Annual Report—Midwest Research Institute, 425 Volker Blvd., Kansas City 10, Mo.

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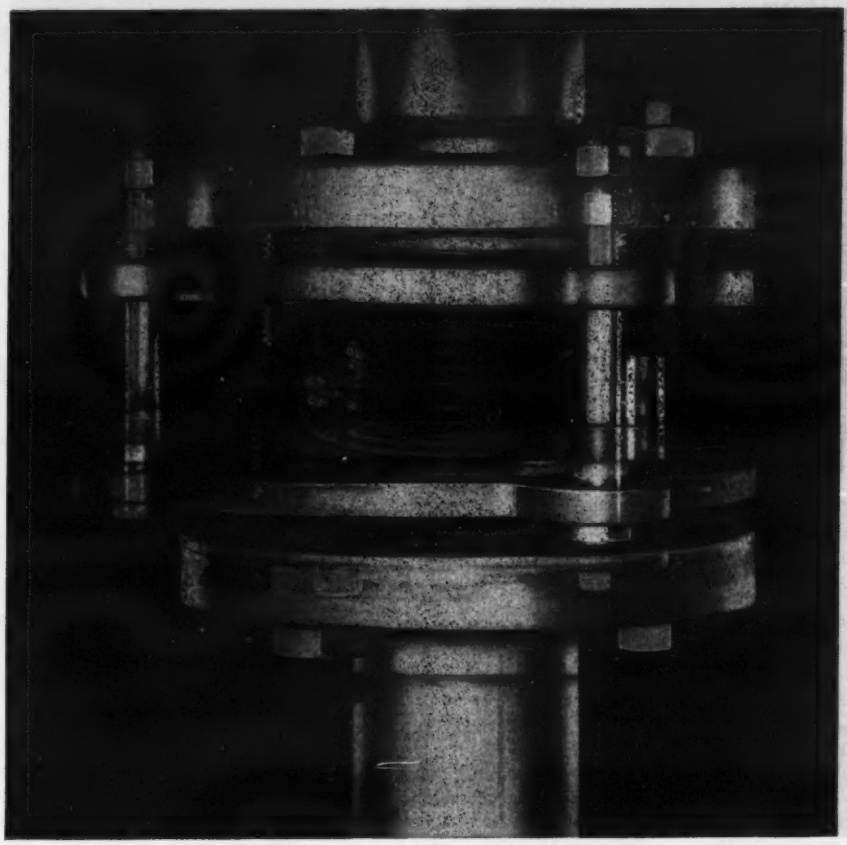
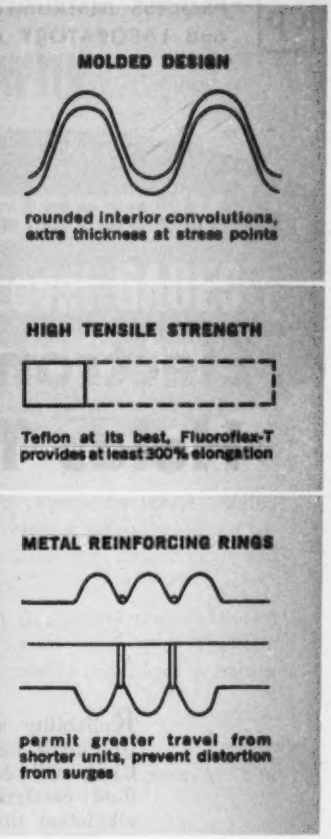



MOLDED DESIGN
rounded interior convolutions, extra thickness at stress points
HIGH TENSILE STRENGTH
Teflon at its best, Fluoroflex-T provides at least 300% elongation
METAL REINFORCING RINGS
permit greater travel from shorter units, prevent distortion from surges

2 MILLION CYCLES AND STILL FLEXING!

...proving that this Teflon expansion joint—molded of Fluoroflex-T —outlasts most other materials and constructions

Chemical manufacturer: Tried Fluoroflex®-T joint, found it *still* flexing after *2 million cycles;* previously had averaged 100,000 cycles from machined Teflon® flex joint in pumping application.

Major industrial product company: Displaced one end of a special Fluoroflex-T bellows ¾-inch from its axis, rotated it around axis at 1,000 rpm. After *20 million cycles,* with still no sign of deterioration, test discontinued.

Petrochemical processor: Installed Fluoroflex-T joints to replace joints machined from Teflon. The Fluoroflex-T joints are still in service after nearly a year.

Fluoroflex-T flex and expansion joints perform so much better for three reasons: (1) *The material:* a patented compound of Teflon that combines high density with low crystallinity for optimum strength and flexibility. (2) *The process:* a unique technique for molding uniform convolutions with restraining rings. This gives undamaged grain structure, rounded interior convolutions and increased strength. (3) *The experience:* Resistoflex has been working with fluorocarbon resins since their inception. For fabricating with Teflon, such experience is *vital.* That's why Fluoroflex-T is Teflon at its best.

So, for corrosion-proof flex and expansion joints that give unsurpassed working life, specify Fluoroflex-T. Write for Bulletin B-1A. Dept. 300, RESISTOFLEX CORPORATION, Roseland, N. J. Other Plants: Burbank, Calif.; Dallas, Tex.

®Fluoroflex is a Resistoflex trademark, reg., U. S. pat. off.
®Teflon is DuPont's trademark for TFE fluorocarbon resins.

Complete systems for corrosive service

RESISTOFLEX

Check 2400 opposite last page.

Operating conditions must be held within strict limits to produce materials of desired quality and quantity in fluid catalytic cracking and alkylation processes. At Clark Oil & Refining Co. . . .

Electronic-Electrohydraulic Teamwork Holds Tight Rein on Process Control

THEODORE W. WETT, Associate Editor
with **FRED OTTO,** Chief Operator, Fluid Catalytic Cracker and HF Alkylation Unit, Clark Oil & Refining Co.
Blue Island, Illinois

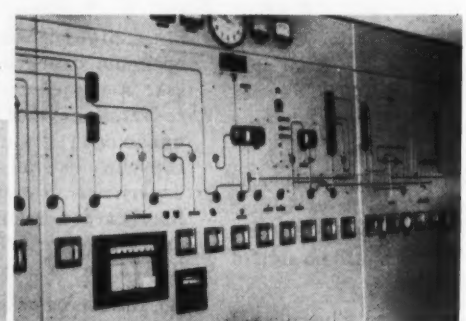
Reliability and "tight" control mark instrumentation on Clark Oil & Refining Co.'s fluid catalytic cracking and alkylation units. Combination of electronic control and electrohydraulic valve operators has proven to be superior to more conventional pneumatic installation used in comparable services.

In fluid catalytic cracking, operating conditions must be held within strict limits to maintain optimum conditions of quality and quantity. Clark's 13,000 bpd installation uses process developed by Universal Oil Products Co. Gas oil is subjected to heat and pressure in presence of a catalyst and breaks down into gasoline, gas, and fuel oil fractions.

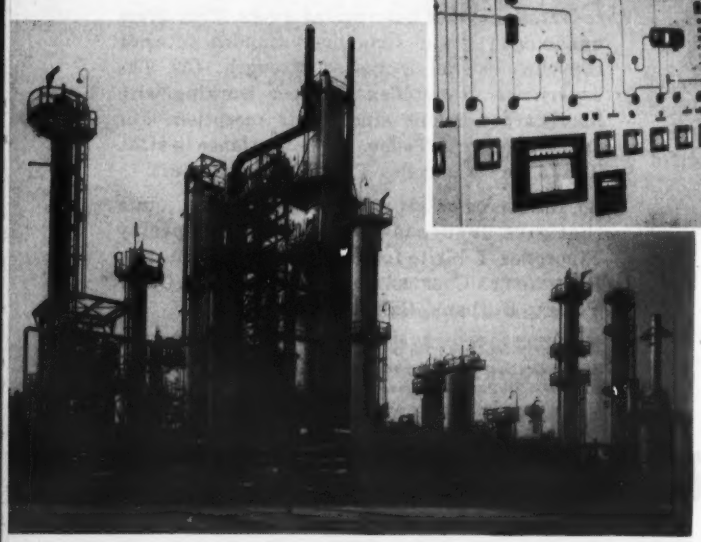
Alkylation unit operates on a 2000 bpd C_4 olefin feed. It produces alkylate gasoline by catalytic action of anhydrous hydrogen fluoride at a contacting temperature of 60°F.

Here are the operating conditions for fluid cat cracker: feed is 13,000 bpd with a 9000 bpd recycle; catalyst is circulated at rate of about 25 tons a minute; and conversion achieved is 75%.

CP Staff Photo ▶



▲ Portion of semi-graphic central control panel. Electronic instrumentation eliminates field mounted controls or trouble-causing pneumatic lines



◀ Clark Oil & Refining Co.'s fluid cat cracker, gas concentration plant and alkylation unit (left to right) are controlled by dependable, fast electronic-electrohydraulic system

Control Method

Reactor temperature (about 900°F) is controlled by varying flow of regenerated catalyst. Signal from thermocouple is fed to electronic recorder-controller. Deviation from set point is corrected by re-positioning slide valve in regenerated-catalyst flow line. This positioning is accomplished by an electrohydraulic operator. Signals from pressure and flow sensing devices are similarly handled to control these variables as required.

While flow of catalyst is primarily determined by reactor temperature, it is important that differential pressure across slide valve be maintained as a safety precaution. To accomplish this, differential-pressure controller signal is fed together with temperature signal to an underride adapter which permits only lowest controller signal to pass through to final control element. Normally, differential-pressure controller output is at a maximum and temperature controller output is something less than this.

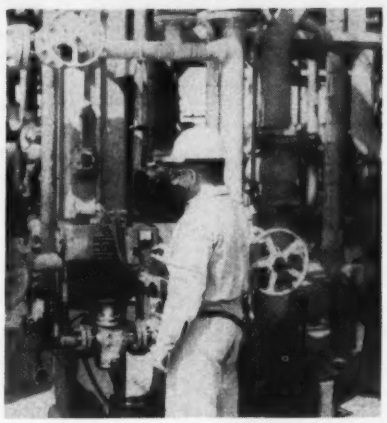
Underride unit has an output which is equal to lowest of two (or more) inputs. In event that differential-pressure signal drops below temperature signal it will then be fed through unit to control valve.

Reactor-bed level and corresponding slide-valve differential-pressure signals are handled in same way.

Reflux flow is regulated by a cascade arrangement based on column temperature. Column top temperature signal is transmitted to a recorder-controller. Signal from this recorder-controller is used to establish set point on recorder-controller that regulates reflux flow rate. Signal from latter recorder-controller activates valve operator to establish required reflux.

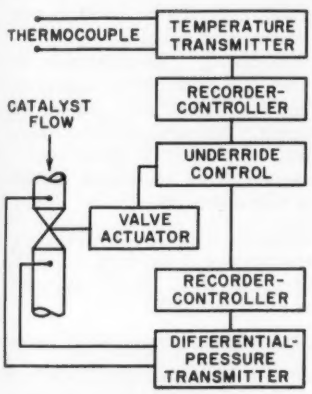
Plug-in feature of electronic controllers simplifies maintenance and keeps parts inventory to minimum

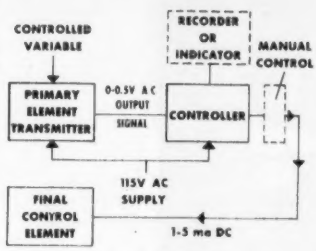
CP Staff Photos



Calibration of electrohydraulic valve operator being checked by Dick Krohn, instrument technician at Clark. These units permit direct, no-lag conversion from electrical signal to valve actuation

Underride control as used on reactor temperature and regenerated-catalyst flow control valve





Typical control loop

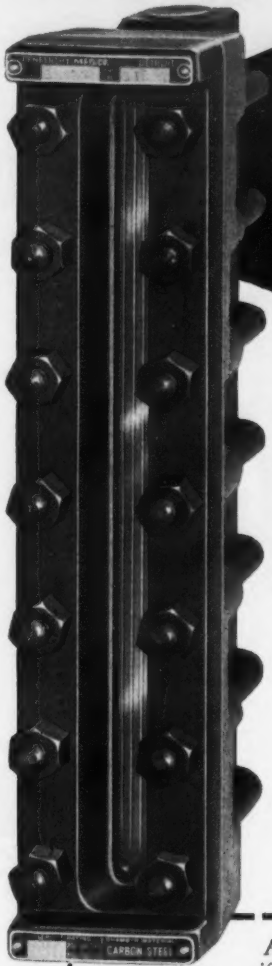
For each control function, recorder, controller and manual control unit with valve-position indicator (where desired) are mounted in a single case in central control panel. Controllers are fully electronic. Four basic elements of power supply, error amplifier, proportional band and reset, and rate-time are mounted on plug-in printed circuit cards. They can be conveniently slipped into place or removed without disturbing a single wire connection. Unit plugs into back of standard mounting case.

Recorder is also a plug-in unit housed in same case and produces a true linear trace on a 31-day strip chart. Manual control unit plugs into a multiple printed-circuit connector in mounting case. There is no inter-wiring. Mechanical inter-lock prevents removal of manual control unless switch is at unlock position and system transferred to automatic control.

Electrohydraulic valve actuators function as follows: Signal from controller causes a coil to move in field of a permanent magnet and deflect a jet pipe. Pipe delivers hydraulic fluid to actuating piston, opening or closing valve. Piston rod is linked to coil by a feedback lever, feedback spring and adjustment roller.

Tension in spring equalizes force of coil acting on jet pipe to return it to neutral position when piston has brought valve

See for yourself why



PENBERTHY Liquid Level GAGES are your better buy

Without a doubt, Penberthy direct reading liquid level gages always give you a clear, accurate picture of the fluid level and/or color and density of the media.

They are available in a variety of materials and engineered designs to meet your specific requirements . . . corrosive conditions, pressures and temperatures.

REFLEX TYPE...
3 pressure groups to 3600 psig. Lengths to 12 ft. Liquid shows black.

TRANSPARENT TYPE...
4 pressure groups to 10,000 psig. Lengths to 12 ft. Shows color, density and media.

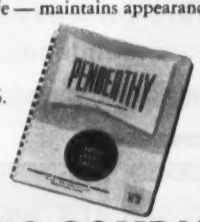
SPECIAL SERVICE TYPES...
High pressure, Frost-Proof, Heating Tube and Heating Chamber, Welding Pad, Large Chamber and Inclined Gages, Explosion-proof Illuminator.

All materials exceed ASTM, ASME and API specifications. Experienced design, exclusive features, selected drop-forged steel, heat-treating, accurate machining, Pyrex glass and accurate assembly assure long, trouble-free service.

Among other advantages...

- Perfect alignment of frame with glass and gasket minimizes leaks or glass breakage.
- Cover completely encloses sides and ends of glass and gasket preventing "blowouts."
- "Raised Face" makes cleaning and glass or gasket replacement easy — *without removing assembly from vessel.*
- Corrosion-resisting paint extends service life — maintains appearance.

Get the facts by writing for Catalog 36. Your inquiry will receive prompt personal attention.



PENBERTHY MANUFACTURING COMPANY
Division of Buffalo-Eclipse Corporation
PROPHETSTOWN, ILLINOIS

Check 2401 opposite last page.

to new setting. A change of input signal equal to 0.1% of full range of 4 ma will result in a corresponding repositioning of valve.

For larger valves, such as one controlling regenerated catalyst flow, jet pipe positions a small piston to which is attached a precision-lapped, four-way valve. Movement of this piston-valve combination causes hydraulic fluid to be pumped to a larger hydraulic power cylinder which changes slide-valve position. Mechanical feedback linkage in this case is between large power cylinder and jet pipe.

Electronic system permits all instruments to be mounted in central control panel. Response to changes in operating conditions is fast and maintenance simple. Plug-in feature means replacement parts are few and completely interchangeable. Units need never be tested at panel, they can be immediately interchanged in whole or in part for convenient checking at instrument bench. Electrohydraulic operators permit a direct conversion from electrical signal to valve actuation.

(Electrohydraulic valve operators are a product of GPE Controls, Inc., 240 E. Ontario St., Chicago, Ill.)

Check 2403 opposite last page.

(Autronic electronic control equipment is supplied by The Swartwout Co., 18511 Euclid Ave., Cleveland 12, Ohio.)

Check 2404 opposite last page.

Thermoelectric instrument finds osmotic pressure of one-drop sample

Uses: Aid in the determination of molecular weight, osmotic coefficients, activity coefficients, vapor pressures of various solvents, dissociation constants and other thermodynamic variables.

Features: Data may be obtained from samples as small as one drop. Measurements can be performed at various temperatures. Any gas environment can be used.

Description: Rates of evapo-

EC&M *Fuseless* AIR-BREAK STARTER GIVES Certified 100/150 MVA FAULT PROTECTION

NO SINGLE PHASING FROM BLOWN FUSES!

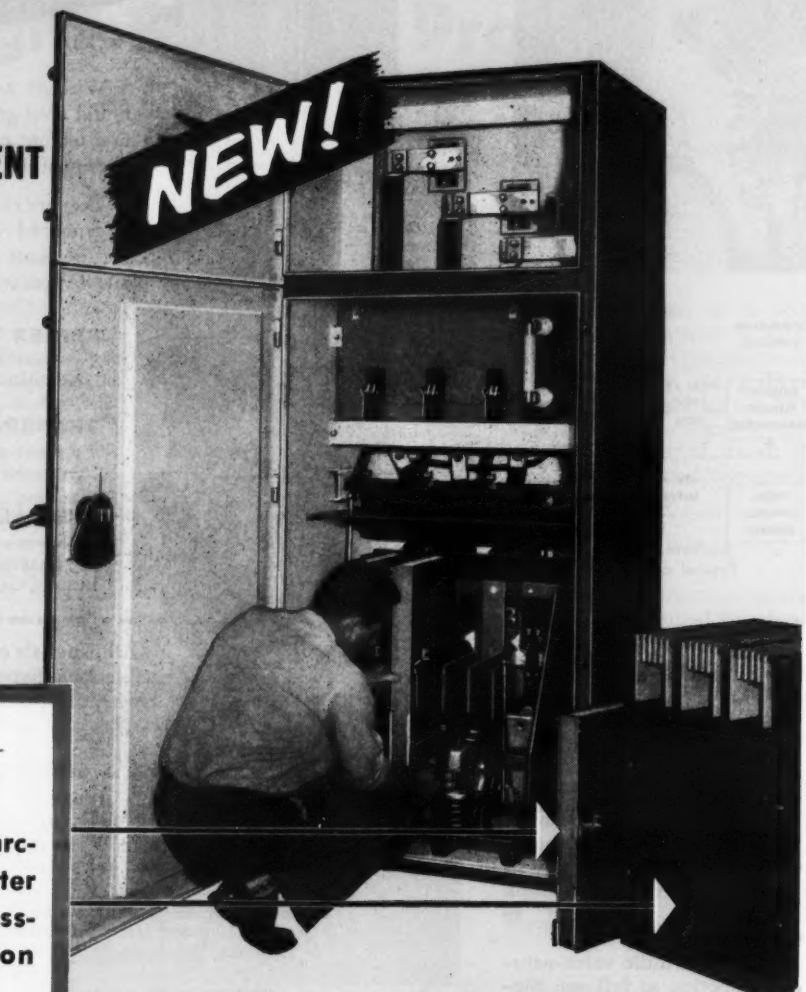
NO COSTLY REPLACEMENT FUSES TO STOCK!

✓ Gang-operated Disconnect Switches Grounded for Safety in Open Position. Mechanically Interlocked with Contactor... Never Open Under Load

✓ No Fuses. Bus Bars Throughout

✓ 3-way Door Interlock. On, Off and Open—with Positive Interlocking between Door, Disconnect and Contactor for Maximum Personnel Protection

✓ Heavy-duty DC Operating Magnet. No Chatter—No Hum



FRONT ACCESSIBLE WITHOUT ROLL-OUT!

Phase barrier and arc-chutes slide out. All starter parts exposed and accessible for easy inspection and maintenance

Get the complete story on certified fuseless fault protection for high-voltage motor drives. Write for Bulletin 8130A

THE ELECTRIC CONTROLLER & MFG. CO.
A DIVISION OF THE SQUARE D COMPANY
CLEVELAND 28 • OHIO

2635

Check 2402 opposite last page.

ration of an unknown solution and a known reference solution are compared. Comparison is accomplished by forming a thermocouple into small loops of Constantan and Manganin alloy wires with a thermojunction in each loop. Drops of solutions are placed on opposite loops and difference in thermal EMF determined.

(Thermo-Electric Osmometer is supplied by Rosemount Engineering Co., Minneapolis 24, Minnesota.)

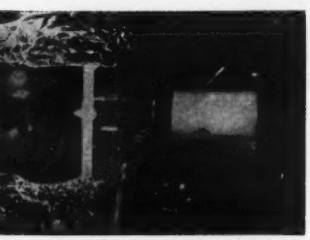
Check 2405 opposite last page.

Temperature to 12,000°F obtained with portable plasma jet

Uses: Flame spraying for materials coating, testing and spectroscopic studies.

Features: Inexpensive high-temperature source is powered by standard welding generator using commercial bottled inert gas for cooling. Generator is rated at 5 kilowatts.

Description: Small portable plasma jet is basically a high intensity electric-arc, consisting of water-cooled tungsten cathode and copper anode. It



Ultrasonic pulse system measures temperature of plasma jet

is 2¼ by 9 inches long and weighs 3½ pounds. Jet is varied by changing nozzles — standard size 0.375" inside diameter. In flame spraying, material is fed as powder into flame, becomes liquid, is hurled in fine, spherical droplets against surface to be plated.

(Plasma Generator is available from Avco Research and Advanced Development Division, Wilmington, Mass.)

Check 2406 opposite last page.

Bulletin 709 Size 1 Solenoid Starter in NEMA Type 7 enclosure for hazardous gas locations

Cut Costly Inspection Time

Allen-Bradley starters provide millions of operations without maintenance

Valuable maintenance time can be saved by eliminating "routine" inspections. Install Allen-Bradley starters, and you can forget them for long periods of time—they will prove completely reliable without regular "service" inspection.

It's the simple solenoid contact mechanism in Allen-Bradley starters that makes this possible. There is only ONE moving part—and this is your assurance of millions of trouble free operations. There are no bearings to corrode and stick . . . no flexible jumpers to wear and break. In addition, their double break, silver alloy contacts are always in perfect operating condition—and remain so until completely worn away. Also, all A-B starters have permanently accurate and reliable thermal overload relays that protect motors against burnouts—whatever the atmospheric conditions may be.

Specify Allen-Bradley *quality* motor control . . . you'll save much valuable maintenance time—and maintenance dollars.

NEMA 4 Watertight Weatherproof

NEMA 9 For Hazardous Dust Locations

NEMA 8 For Corrosive Hazardous Gas

NEMA 11 Corrosion-proof

Allen-Bradley Co., 104 W. Greenfield Ave., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

ALLEN-BRADLEY Quality Motor Control

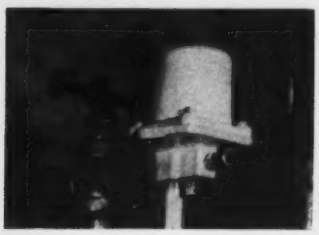
Check 2407 opposite last page.

Detector converts pressure directly to electrical resistance

Alarm pressure is changed by simple adjustment

Uses: Monitors gas, fluid, or vapor pressures in processing equipment and pipelines.

Features: Available in ranges from inches of mercury to pressures of 3000 psi.



Resistance pressure detector is only 2-5/16" in diam by 2-1/8" long

Description: For under 30 psi, precision capsule is sensing element. From 30-3000 psi, special Bourdon tube elements used. Output linear.

(Model 328 RPD resistance pressure detector available from Instrument Division, Thomas A. Edison Industries, McGraw-Edison Co., West Orange, N.J.)

Check 2408 opposite last page.

Counting and switching variations possible with control unit

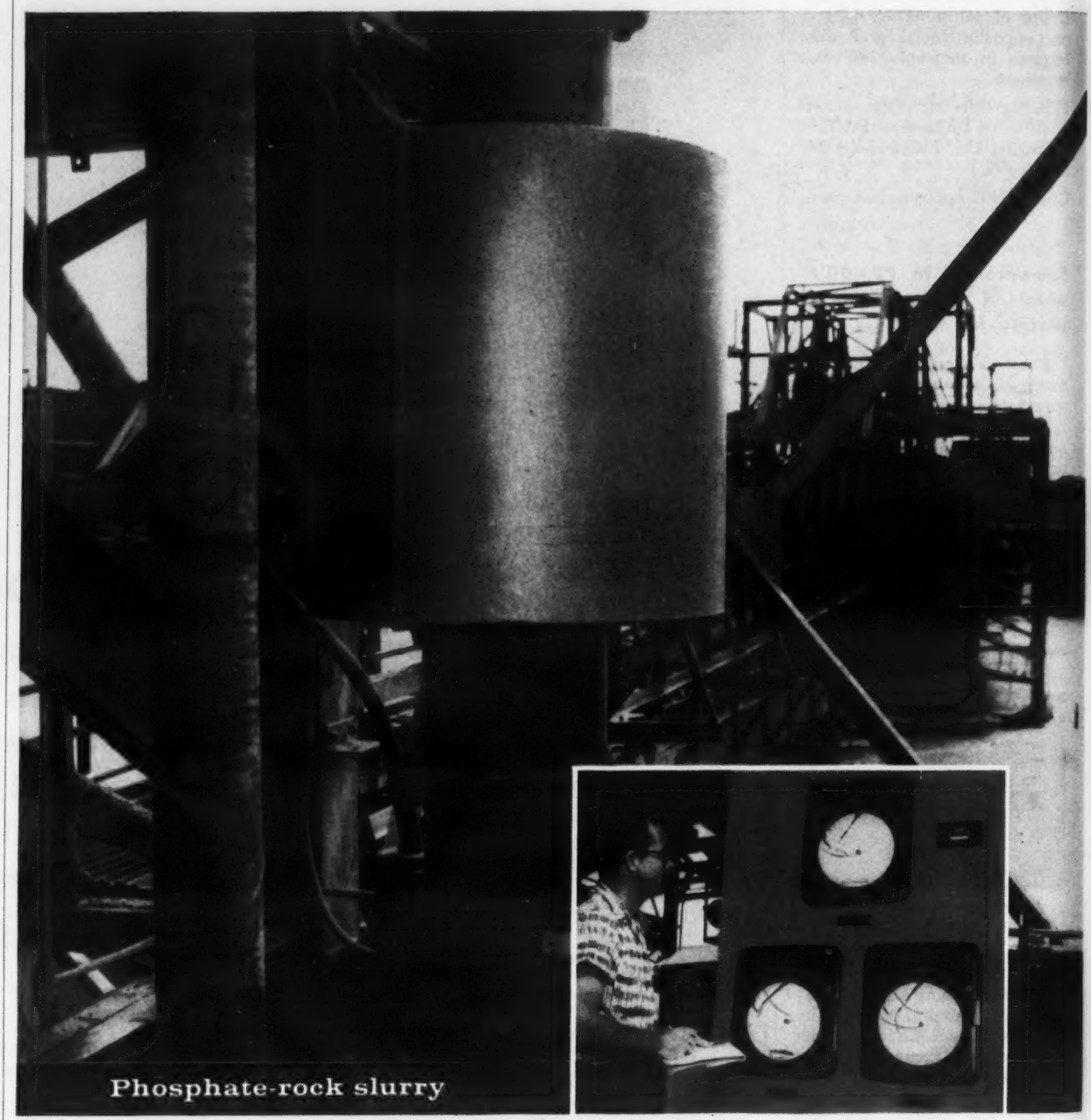
Up to 1000 counts/minute with simple presetting

Uses: Automatic cycling control of machines and processes in such applications as liquid-metering control; interval indication in high production count; forward and reverse control with preset limits; control of motors, valves, pumps, relays, and signals; size control for wound reels or spools; and container filling.

Features: User has option of three different arrangements—one-count switching, one-cycle switching, and differential (add and subtract)

at International Minerals –

sand, acid, rock . . . nothing stops



Phosphate-rock slurry

This 16" Foxboro Magnetic Flow Meter is part of a mass-flow system for measuring phosphate rock slurry pumped to flotation plant. Meter measures slurry in gpm, while nearby gamma ray density cell measures density of solution. The two variables are recorded separately, and their product is then recorded in dry-tons-per-minute on the third Dynalog instrument on the panel above. Recorder readings are telemetered to mine head so operators will know how much rock to feed into pipeline.

the Foxboro Magnetic Flow Meter

"One meter even paid for itself in 4 months" –

reports J. H. Andrews, senior development engineer

You'd travel a long way to find a process with as many meter-killing liquids as at International Minerals and Chemicals Corp., Bartow, Florida. Phosphate-rock slurries, sand-water slurries, phosphoric acid — yet they're all metered accurately, continuously with Foxboro Magnetic Flow Meters.

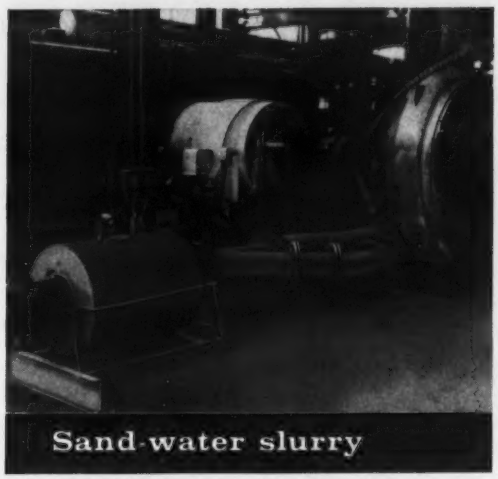
The Magnetic Meter is perfect for such "difficult liquids." It has no flow restrictions of any type — nothing to plug up. Instead, electrodes flush-mounted in corrosion-proof meter wall sense flow rate magnetically — send a linear proportional signal to a Foxboro Dynalog* Electronic receiver.

Magnetic Meters are installed as simply as a length of pipe — require no special meter runs, or straightening vanes. Maintenance is virtually nonexistent.

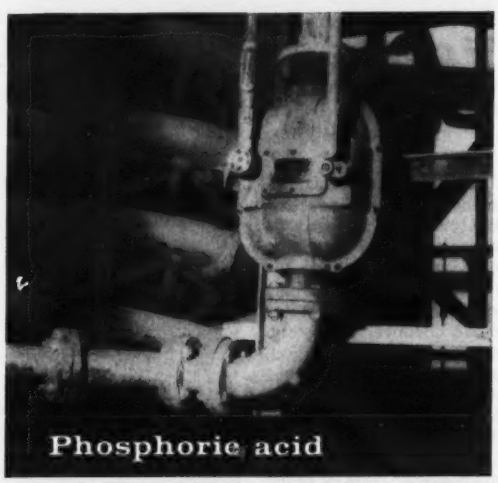
Ask your Foxboro Field Engineer for full details on the high-accuracy, low maintenance Magnetic Flow Meter. The Foxboro Company, 8112 Neponset Ave., Foxboro, Mass.

*Reg. U. S. Pat. Off.

Write for Bulletin 20-14.



International Minerals uses this 12" Foxboro Magnetic Flow Meter to control pumping rate of sand and water slurry. Foxboro Dynalog Controller holds pump discharge within ±1% of its 6000 gpm capacity. Slurry is so abrasive, entire pump unit must be replaced every six weeks. Only work done on Magnetic Meter, however, has been one "preventive maintenance" liner replacement during 3 years of continuous operation.



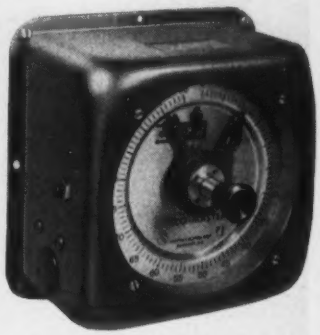
One of six Foxboro 3" Magnetic Flow Meters at International's Bonnie Chemical Works. Meters measure phosphoric acid with better than ±1% accuracy. Although meters have been operating up to 4 years, under highly corrosive conditions, none have ever required maintenance.

FOXBORO
REG. U.S. PAT. OFF.

Check 2409 opposite last page.

counting and switching.

Description: Operating on 115-volt, 60-cycle current, unit counts at speeds up to 1000 counts minute. It can be preset to any cycle from one to 100 counts by turning knob



Counter instantly and automatically recycles an integral control circuit

dial. Zero manual reset allows count cycle to start over from beginning.

It is designed for either wall or panel mounting. Compact unit is completely enclosed in steel housing.

(Cyclo-Master is development of Counter and Control Corporation, 4503 W. Brown Deer Rd., Milwaukee 18, Wisconsin.)

Check 2410 opposite last page.

Variable-speed control on lab-size disperser makes it more useful

Uses: Unit will homogenize, disperse, emulsify, and simultaneously deaerate, defoam, or dehydrate wide range of light to viscous formulations.

Features: Unit is available in corrosion-resistant construction. Variable-speed control permits feed rates from one pint to two gal/min.

Description: High-speed, high-shear device is driven by variable speed ¾-hp motor. It operates under pressures ranging from atmospheric to 30 in vacuum.

(Model D8 Versator is product of Cornell Machine Co., 99 Wall St., New York 5, New York.)

Check 2411 opposite last page.

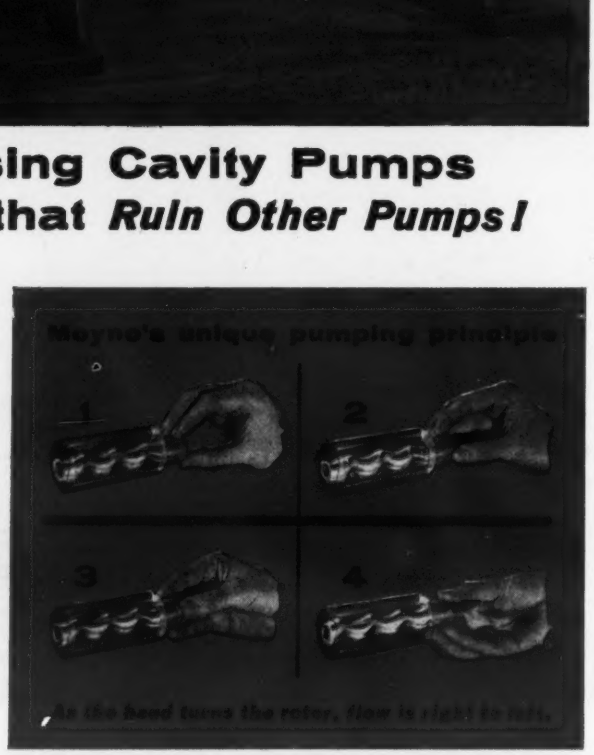
MOYNO®
CHEMICAL PUMPS

MOYNO, Progressing Cavity Pumps Handle Chemicals that *Ruin Other Pumps!*

MOYNO's unique *"progressing cavity"* principle and special resistant internal parts slash pump maintenance costs on problem chemicals that ruin other pumps. Any chemical that can be forced through a pipe—from thin watery slurry to extremely viscous rubber dough—can be pumped with a MOYNO.

As illustrated at right and in the cutaway model above, a rugged screw-like rotor turning inside a double-threaded stator forms *"progressing cavities"* which move chemicals smoothly. Fluids are pumped without turbulence, agitation or pulsation, and discharged uniformly. Rotor and stator materials resist abrasion and corrosion. Hundreds of difficult chemicals successfully handled prove that MOYNOS show little wear, even after long service. They have increased production and greatly lowered downtime on many jobs where they replaced other type pumps which had run up prohibitive maintenance costs or failed completely. On other jobs, MOYNOS have succeeded where chemicals were formerly moved by hand or other expensive means because they were considered unpumpable.

MOYNOS are available in capacities up to 500 gpm; pressures up to 1000 psi. Off-the-shelf replacement parts are always immediately available. To find out how you can decrease chemical pumping costs, write today for Bulletin 40 CP



ROBBINS & MYERS, INC.
motors, household fans, Propellair industrial fans, hoists, Moyno industrial pumps
SPRINGFIELD, OHIO • BRANTFORD, ONTARIO

Check 2412 opposite last page.

Controls, indicates flow, using mechanical feedback

Uses: Positioner regulates control valve minimizing transmission lags and provides high order of precision positioning. Intended for applications for valve may stick because of deposits, valve stem is subject to friction or large unbalanced forces, and where valves should respond to small changes in controller output air pressure.

Features: Instrument combines, in one valve-mounted unit, functions of indicating pneumatic-controller (for temperature or pressure) and a valve positioner, which amplifies air power to a pneumatic operated control valve.

Description: In place of pneumatic feedback from bellows assembly, new unit employs mechanical feedback from valve stem through lever system. Result is to force valve to assume a position proportional to the controlled variable (within the controller's proportional band.)

Unit can be mounted by valve manufacturer on most makes of diaphragm motor valves or certain other types of pneumatic operators. It requires only one air supply.

Pressure elements cover range of 30″ Hg vacuum to 10,000 psi. Filled-system thermometer elements cover range of −350 to +1000 F.

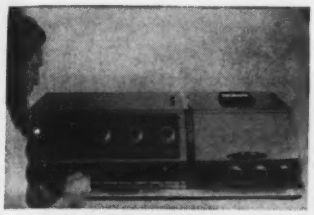
(Pilot-Positioner is product of U.S. Gauge Division of American Machine & Metals, Inc., Sellersville, Pennsylanvia.)

Check 2413 opposite last page.

Accurate color difference found automatically with meter

Uses: Automatic comparison of two or more colors in paint, plastics, leather, ink, glass, ceramics, rubber, and other products.

Features: Meter automatically compares two or more colors in terms of a three-number designation. Instrument precision, when dealing with small color intervals be-



High-sensitivity of color-difference meter permits precise measurement of dark colors

tween spectrally nearly identical samples, is comparable to smallest perceptible color difference discernible by the trained human eye of a color matcher.

Description: High-sensitivity, self-standardizing automatic color-difference meter indicates color difference on any of four tristimulus scales based on luminosity or reflectance. Three automatic null-balance circuits produce exact measurements of: 1 — whiteness vs blackness, 2 — redness vs greenness, 3 — yellowness vs blueness. An electronic amplifier and three balancing motors turn potentiometers to corresponding dial values.

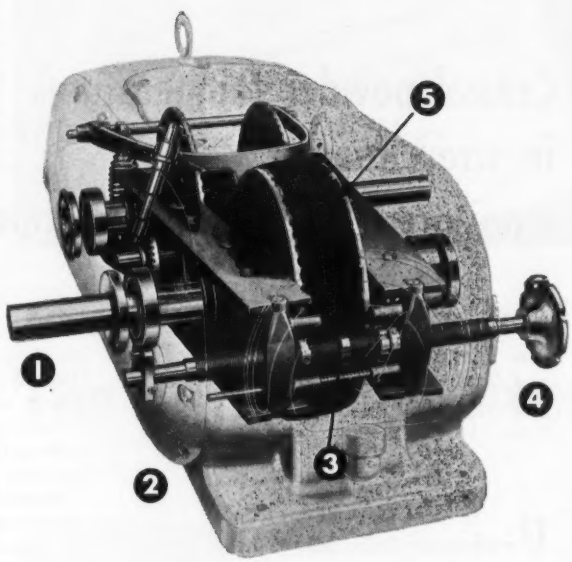
Overall size of complete instrument is mounted on base plate and is 38″ long, 20″ wide, 11″ high. Total approximate weight is 125 lb.

(Color-difference meter Model AC-2 is a product of Gardner Laboratory Inc., 5521 Landy Lane, Bethesda 14, Maryland.)

Check 2414 opposite last page.

"What a lab assistant!"

PUT TEETH IN YOUR SPEED CHANGING JOBS

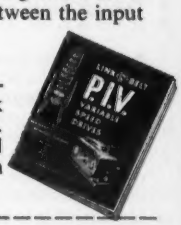


Get the positive, accurate control that only LINK-BELT's chain-driven P.I.V. can deliver

Yes, you put teeth into your speed changing jobs because Link-Belt P.I.V.—unlike other variable speed drives—utilizes an exclusive metal, self-tooth-forming chain.

Here's how it works! P.I.V. chain consists of a series of overlapping steel links. The links contain packs of slats which are free to move from side to side, singly or collectively, to serve as teeth. The chain meshes with radially grooved wheels, which are cut to a constant depth towards the wheel periphery. Beveled sides of the grooves offer gripping areas . . . provide a positive, nonslip contact at any speed, under all loads.

Makes changing speed simple too! A turn of the control screw simultaneously varies the effective diameters of the conically shaped wheels—closing one set, spreading the other. At the same time, the self-tooth-forming chain automatically adjusts to provide desired ratio between the input and output shafts.



BOOK 2274—Your Link-Belt office or authorized stock-carrying distributor has Book 2274 on P.I.V. drives from ½ to 25 hp. Refer to the yellow pages of your local phone directory under Power Transmission Equipment.

(1) You can get minute speed changes and maintain them accurately while operating under full load.

(2) All-metal, totally enclosed—unaffected by atmospheric conditions. All vital operating parts splash-lubricated from a common housing reservoir.

(3) Easy-view speed indicator facilitates speed selection and adjustments to meet all requirements.

(4) An infinite number of positive, stepless speed adjustments may be made with manual, electric, pneumatic or hydraulic controls.

(5) Self-tooth-forming chain is made from a series of overlapping steel links. Links contain packs of hardened steel laminations or slats (shown above). Slats grip toothed wheels positively without slippage —give the speed you need at any setting.

19,249

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To serve Industry There Are Link-Belt Plants, Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World.

LINK-BELT
P.I.V. VARIABLE SPEED DRIVE

Check 2415 opposite last page.

So SIMPLE
We Can
Adapt It
to ANY
LIQUID LEVEL
CONTROL JOB
A sleeve, raised and lowered within a non-magnetic tube, attracts or releases an Alnico magnet attached to a mercury switch. Basically, this is Magnetrol.
MAGNETROL

AS DEPENDABLE AS MAGNETIC FORCE ITSELF

● No matter how specialized the liquid level control application, adapting Magnetrol to meet it presents no problem. Whether it's for high pressures, high temperatures, corrosive liquids or any other condition, a few "standard" modifications and the job is done! Operation is so simple no changes in basic design are needed. That's why Magnetrol "fits" practically any application — why "specials" are so often standard with us.

Because of the utter simplicity and dependability of its magnetic principle, Magnetrol has *infinite operating life.* There are no wearing parts to get out of order.

Magnetrols are available for controlling level changes from .0025-in. to 150-ft., with single or multi-stage switching. Our experienced engineering staff is at your service.

MAGNETROL, Inc.

WHY NOT MAIL THE COUPON — NOW

MAGNETROL, Inc., 2129 S. Marshall Blvd., Chicago 23, Illinois
Please send me catalog data and full information on Magnetrol Liquid Level Controls.
7
Name_____
Company_____
Address_____
City_____ Zone_____ State_____

Check 2416 opposite last page.

Thermocouple junctions protruding from the screw shaft give accurate measure of reaction bed temperature

Critical powder temperatures in screw reactor monitored by sheathed thermocouples

F. M. TEETZEL, J. A. WILLIAMSON
A. E. ABBOTT, and R. L. MADDOX
Technical Division
National Lead Company of Ohio, Cincinnati, Ohio

Problem: Laboratory investigations showed that subjecting UO_3 powder to temperatures in excess of 1200°F during its reduction with hydrogen to UO_2 (as a step in production of metallic uranium) hinders its ability to undergo hydrofluorination in a subsequent process. Results of production operation, using screw-conveyor-type reduction reactor, indicated that this temperature was often exceeded because of the exothermic nature of reduction reaction.

Skin thermocouples, conventionally peened to reactor tube, were found to be not sufficiently sensitive to reflect actual powder temperature while powder was undergoing reaction. A more sensitive system of temperature detection was necessary.

Horizontal tubular reactors used were 16″ ID by 22′ long, the middle 18′ of which was enclosed by an electric muffle furnace. Solids were conveyed through the furnace by a ribbon flight screw 14⅝″ ID and 20′ long. Gas flow through reactor was countercurrent to solids flow. Screw was designed to agitate solids sufficiently to effect maximum contact between UO_3 and hydrogen gas.

Solution: Sheathed chromel-alumel thermocouples, 3/16″ OD, were installed as sensing elements. These consisted of thermocouple conductors surrounded by magnesium oxide insulation and sheathed with Inconel or 310 stainless steel. Metal sheath and measuring junction assembly were welded to form a grounded junction.

Reduction reactor screw on which thermocouples were installed consisted of spiral ribbons supported by ribs radiating from a 6″ OD hollow shaft of 309 stainless steel. On the idling end, a solid shaft bolted to the hollow shaft extended out of the reactor through a packing gland and bearing assembly.

Sheathed thermocouple lead wires were drawn through a boring in this shaft into the hollow screw-shaft, and thence out of the screw-shaft through compression fittings which formed a gas seal. The 16 sheathed thermocouples were strapped to the outside of the screw shaft and terminated with grounded hot junctions at desired intervals along the screw.

Thermocouple signals were transmitted through lead wires to stationary terminals by means of a mercury pool commutator. Output from a selector switch was transmitted to a curve-drawing (0° to 2500°F) strip-chart recorder. Temperature from one thermocouple was recorded for two revolutions of screw and then room temperature on every third revolution. As screw rotated, radial position of thermocouple with respect to powder bed changed continually. Thus, a slight cycling of temperature was indicated by each thermocouple; temperature increased as thermocouple approached bed and decreased as it receded.

Thermocouple hot junctions were installed on first such screw constructed so as to be in thermal contact with the shaft. Temperatures indicated with this arrangement were tempered by the thermal mass of shaft and were indicative of general temperature gradient along shaft, rather than indicating the powder bed temperature.

A second installation was completed with thermocouples bent so that tips protruded from shaft and hot junctions were about three inches from shaft. Thus, measurements were not tempered to as great an extent by thermal mass of shaft, and hot junctions passed through and were more sensitive to temperature of powder bed.

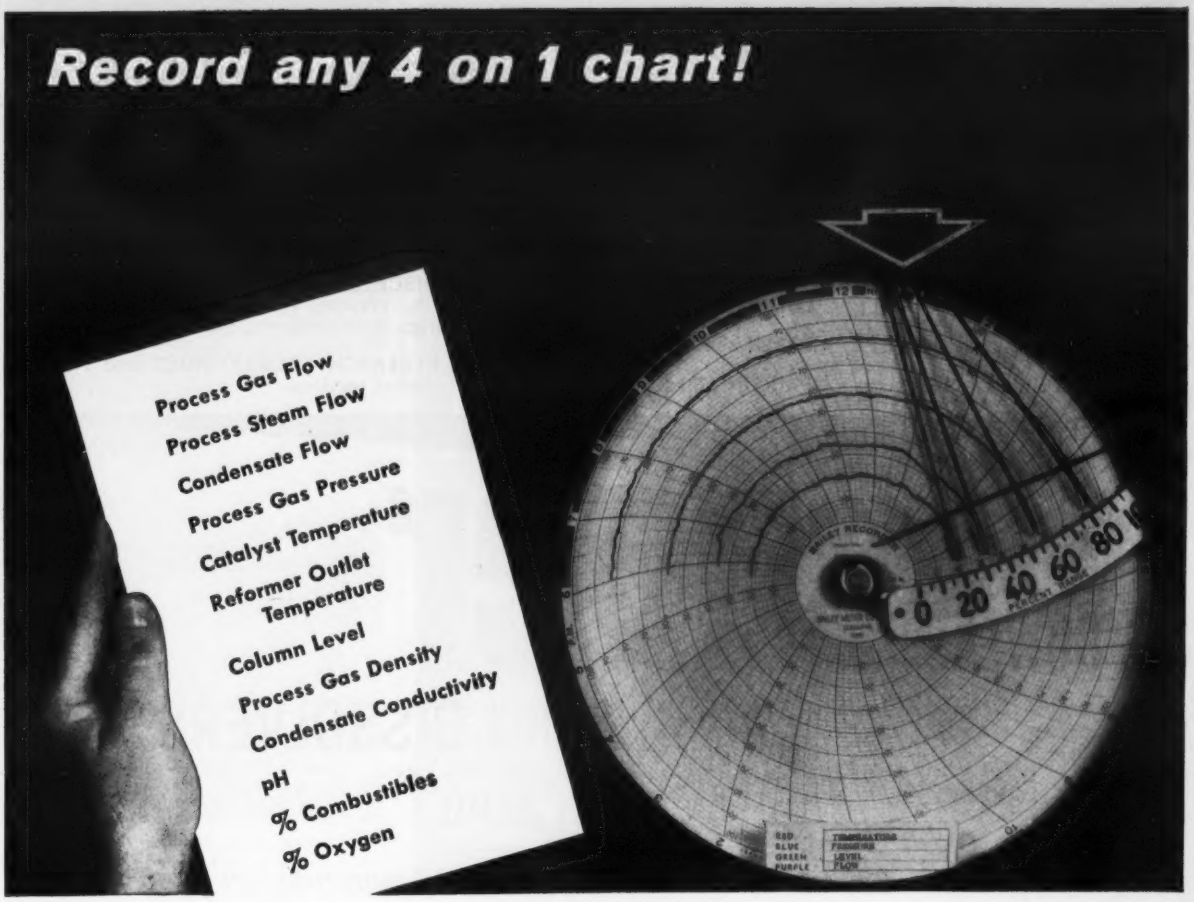
Results: Sheathed thermocouples have made possible obtaining internal reactor temperatures not previously measurable. Valuable information was developed on effect of operating variables, particularly in reaction zone.

This technique should be applicable to similar situations in chemical industry where temperature measurements in rotary equipment are needed.

(Condensed from a paper read before the St. Paul National Meeting of A.I.Ch.E., September 1959.)

(Ceramo sheathed thermocouples were supplied by Thermo Electric Co. Inc., 109 Fifth St., Saddle Brook, N. J.)

Check 2417 opposite last page.



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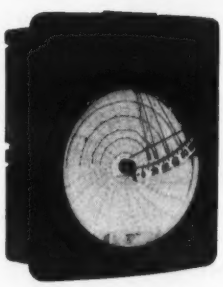

Records four variables on one chart.

You can lower the cost of your equipment investment and increase the efficiency of your entire operation with the Bailey Receiver Recorder.

HERE'S HOW

The interchangeable components for the Recorder make it fast, inexpensive, and automatic to do up to *four* measuring jobs at the same time with either or both pneumatic and electric systems.

This Bailey unit continuously and simultaneously records four variables on the same chart. And, they are *in the same linear scale measurement.* You have clear, easy-to-read records for continual analysis and control.

Plug-in, pre-calibrated receivers can easily be adapted on-the-job to revised process requirements. The Bailey Receiver Recorder saves you money with a minimum instrument investment for process cycle expansion or alteration. Let your local Bailey engineer suggest applications to fit your operation. Or write for specific control systems information for your entire plant operation. CP105-1

Chemical and petroleum division

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This model:
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will produce many times as much as ordinary mixers...better, in less space, at less cost!

The new Cowles Super Series Dissolvers are high speed, high shear, impeller-type units. They easily handle viscosities in excess of 50,000 centipoises and are the only full proven units for big plant production as well as small.

Now, in addition to "the teeth that make the BIG difference," the new "MPD" unit, including full instrumentation, offers important advantages not available in any other mixer.

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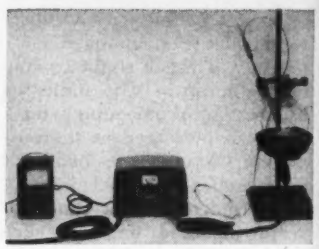
Check 2419 opposite last page.

Transistorized system for temp control has tolerance of ± 0.1 °C

Uses: Temperature control of fluid systems over temperature range of −38°C to 340°C.

Features: Transistorized automatic control system provides continuous, automatic, precision temperature control in both liquid and air baths to



Unit controls temperature in any system where a mercury thermometer can be used

a tolerance of ±0.1°C. It permits completely unattended operation without interruption, for days if necessary.

Description: System can be applied to any situation where a mercury thermometer can be used as primary sensing element. Effective temperature range is −38°C to 340°C. System is particularly suited for use in reactions, fractionations, distillations, and reflex splitting. It can be coupled with a strip-chart recorder to provide continuous temperature history record.

System consists basically of a transistorized crystal controlled oscillator circuit. It senses mercury column position through an electrode attached to outside surface of thermometer.

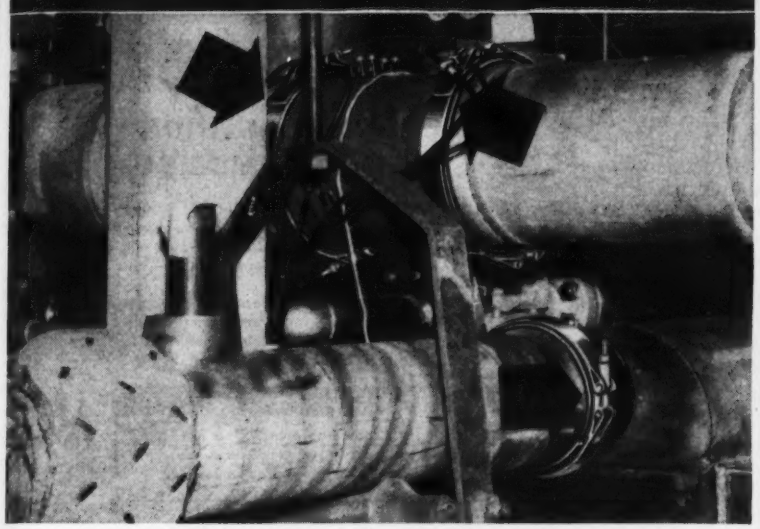
(Transistorized temperature control system is a product of Milltown Instrument Company, Milltown, N. J.)

Check 2420 opposite last page.

NEXT MONTH

Is control of pH critical in your process? See this section next month for details on a control system that holds this variable within close limits at Sika Chemical Corporation.

MARMAN CONOSEAL Joints Chosen for Use in Critical Pipe Installations



Marman CONOSEAL Joints on a closed cycle gas turbine installation now under construction by the U.S. Army Engineer Reactors Group at Fort Belvoir, Virginia.

The All-Metal Marman CONOSEAL Joint is designed to provide absolute dependability in connecting and sealing piping and tubing. It can be used on gas, liquid, vacuum and liquid metal systems under these pressure and temperature extremes:

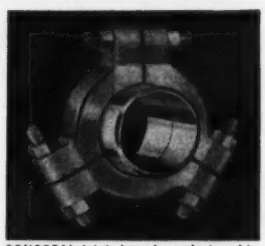
−450°F. to +2000°F.
full vacuum to 20,000 psig.

Through the mechanical advantage of its unique metal gasket, the CONOSEAL Joint also withstands linear deflections up to 1/16" without leakage.

This gasket is designed to yield within the assembly of two mating flanges. Compressed radially and axially, the gasket is completely confined and acts, literally, as a fluid seal. Although 100% metal-to-metal contact is made, this gasket action does not brinell the flange faces. Thus, the joint can be disassembled and reassembled without flange replacement.

Lightweight and compact, the CONOSEAL is available in various configurations to meet a wide range of applications. Write today for your copy of the new CONOSEAL catalog.

CONOSEAL is an Aeroquip Trademark



CONOSEAL Joints have been designed in pipe sizes from ½" to 36" and fabricated with materials such as Zircaloy (reactor grade), 400 and 300 Series stainless steel, nickel steels, mild and low alloy steels and aluminum.

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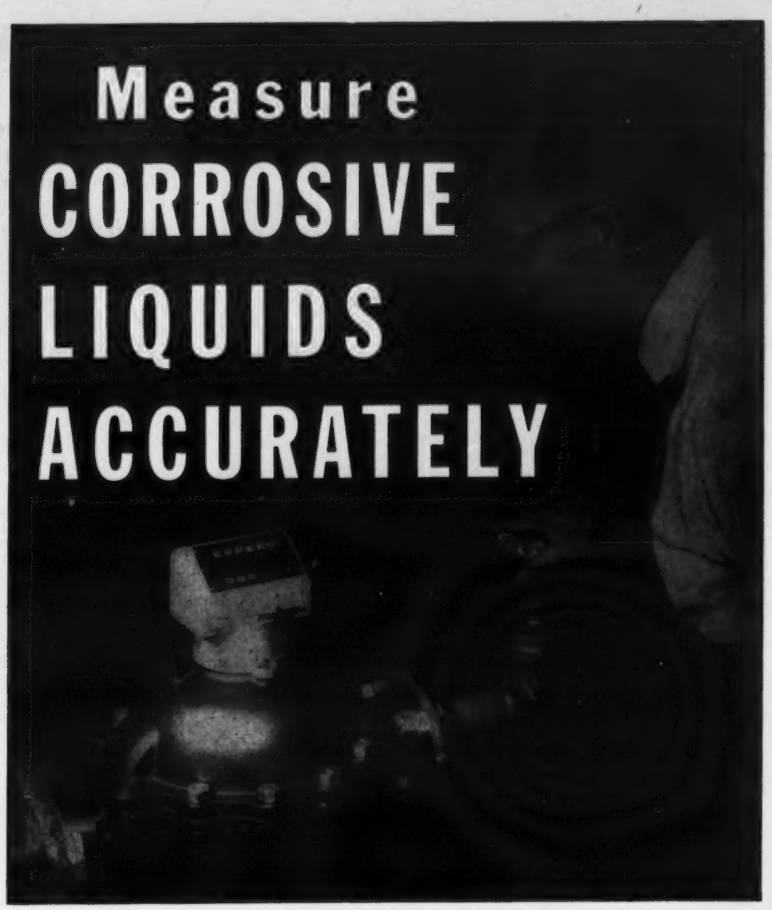
Check 2421 opposite last page.

Measure CORROSIVE LIQUIDS ACCURATELY



with NIAGARA Displacement Meters

Now you can apply the extreme accuracy of Niagara Meters to the measurement of corrosive liquids. Niagara Chemical Meters of Type 316 stainless steel offer good resistance to corrosion and can be used to measure caustic soda, most acids, fruit juices and similar liquids. Available in sizes 3 to 110 G.P.M. or in intermittent use up to 160 G.P.M. Niagara Chemical Meters are also available for automatic liquid measurement and liquid flow control in hazardous or non-hazardous atmospheres.

If you have corrosive liquid metering problems, let us help you. Mail coupon today.

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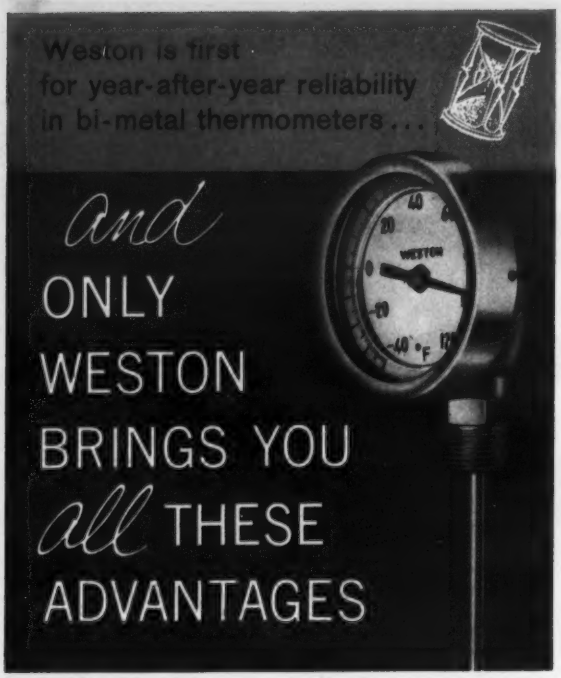
Please send me information on the complete line of Niagara Meters.

Liquid.....
Flow g.p.m..... Temp.....°F
Name.....
Company.....
Address.....

Check 2422 opposite last page.



Breadth of line . . . number of desired features . . . quality of craftsmanship . . . ruggedness and stability – from any point of view, Weston thermometers are unsurpassed. Yes, the company that introduced the bi-metal to industry continues its leadership. That's why your smartest move is to entrust your process to no thermometer but a Weston.

FOR EXAMPLE, LOOK AT ALL THE ADVANTAGES YOU GET WITH THE NEW WESTON '4000' SERIES:

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- REMOVABLE BEZELS FOR EASY WINDOW REPLACEMENT IN THE FIELD
- ADVANCED GASKET MATERIAL TO PROTECT AGAINST "BREATHING" AND LEAKAGE EVEN UNDER EXTREME OUTDOOR ENVIRONMENTAL CONDITIONS AND LOW TEMPERATURE MEASUREMENT SERVICE WITHOUT FOGGING OR FREEZE-UP
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- FULL LINE OF SIZES, STEM LENGTHS AND RANGES IN BACK AND BOTTOM-CONNECTED MODELS

For full information and name of local distributor, contact your local Weston representative . . . or write to Daystrom-Weston Sales Division, Newark 12, N. J. *In Canada: Daystrom Ltd., 840 Caledonia Rd., Toronto 19, Ont. Export: Daystrom Int'l., 100 Empire St., Newark 12, N. J.*

WESTON A DAYSTROM UNIT

Bi-metal Thermometers

WORLD LEADER IN MEASUREMENT AND CONTROL

Check 2423 opposite last page.

Obtain electrical output from pneumatic input with integrator

Uses: Monitoring and recording air pressure signals and converting these into output of contact closures.

Features: Unit handles output of regular instrument up to 500 counts per minute. Special units available up to 1500 counts per minute. Proportionate electrical output related to air pressure in either linear or square root function.

Description: Measured variable, in form of air pressure, causes servo unit to rapidly and accurately position ball carriage.

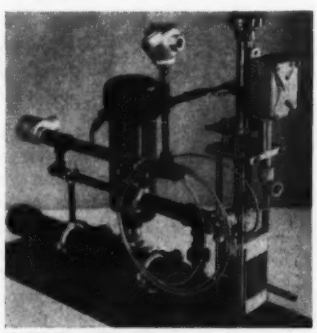
(Royson Integrator is available from Royson Engineering Co., Hatboro, Pa.)

Check 2424 opposite last page.

Pipeline viscometer has accurate temp control

Uses: Applicable to side streams continuously withdrawn from main pipe lines.

Features: Accurately maintains desired measuring temp.



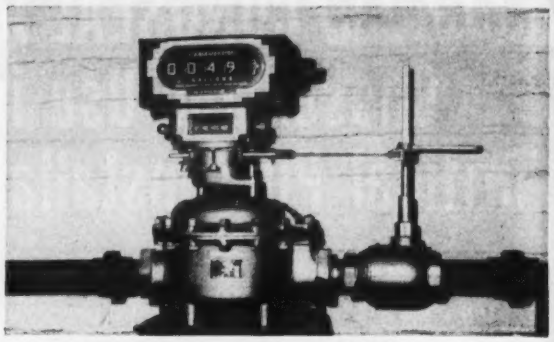
Pipeline viscometer shown attached to simulated pipe

Description: Viscosity is measured by falling piston. Time of fall is transmitted. First stage self-contained (normally cooling); second is electrically heated, controlled by electronic controller using resistance bulb.

(Pipeline viscometer supplied by Norcross Corp., Newton 58, Mass.)

Check 2425 opposite last page.

It Figures!



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If you batch or blend liquids the automatic shut-off type Rockwell ER Industrial meter (pictured above) gives positive quantity control to stabilize the quality of your end product. You'll eliminate the need for costly weigh tanks and laborious handling—also gain the advantage of a closed piping system.

Throughout your plant Rockwell meters spell advantages wherever liquids are piped or used—for inventory and department controls; for tax records, etc. Our bulletins tell all. Write Rockwell Manufacturing Company, Pittsburgh 8, Pa.

LIQUID METERS
another fine product by
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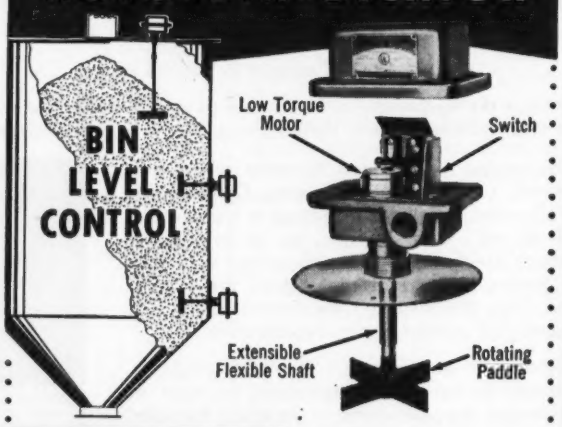
Check 2426 opposite last page.

ROTO-BIN-DICATOR



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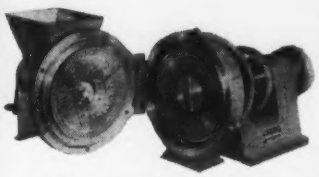
Check 2427 opposite last page.

Pilot-scale refiner simulates products from production

Uses: Pulping processes and strength development studies on raw, steamed or semi-chemically cooked chips; fully cooked pulp; cooked straw, many other materials. Operates with dry or fluid feed, hot



Refiner opened to show plate construction

or cold, high or low consistency.

Features: Heavy duty construction. Rated 25 to 40 hp (continuous) and 40 to 65 hp (intermittent).

Description: Twelve-inch refiner employs one fixed, one rotating circular plate assembly. Various feeding devices available.

(Laboratory refiner supplied by Sprout, Waldron & Co., Muncy, Pa.)

Check 2428 opposite last page.

Electronic transmitter converts motion to DC, has easy range change

Uses: Converts motion outputs from flow, pressure, temperature and level primaries to electrical signals compatible with all miniature electronic instruments.

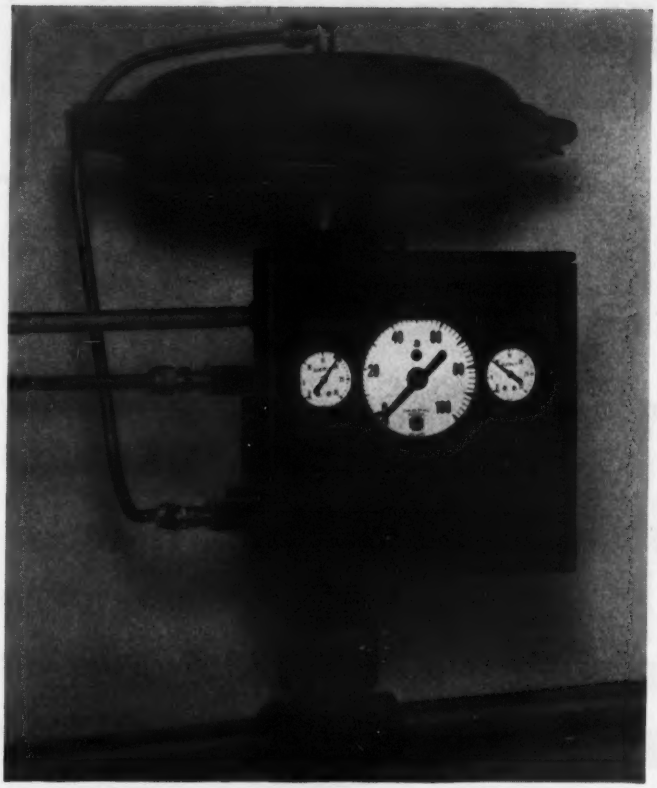
Features: Printed wiring cards permit range changes in field. Output may be set within 3 ranges over a total of one to 50 milliamps DC.

Description: Compact, totally-enclosed instrument has indicating pointer which shows percent maximum flow, etc. Unit operates in ambient temperatures from —20 to 150°F.

(Compatible electronic transmitter supplied by Fischer & Porter Co., 142 Jacksonville Rd., Hatboro, Pa.)

Check 2429 opposite last page.

New...from United States Gauge!

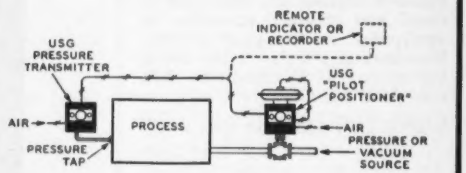


Wide controller model range. The USG Pilot-Positioner is available with most controller models in the USG Pilot line. These include pressure measurement from 30 in. Hg vacuum to 10,000 psi (applicable to liquid level as well), and temperature measurement from —350F to 1000F. Also, proportional band, adjustable for 0 to 75%, or adjustable differential gap (for fast-stroking valve). Unit measures a compact 8½ in. square.

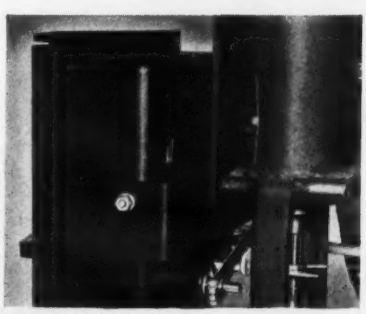
USG CONTROLLER AND VALVE POSITIONER COMBINED!

. . . in low-cost, valve-mounted U.S. Gauge Pilot-Positioner

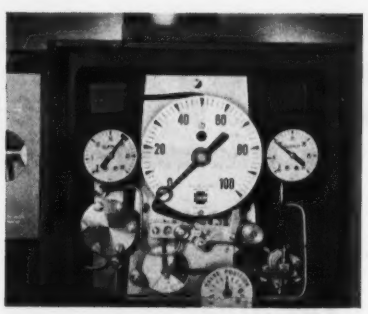
First practical combination of an indicating pneumatic controller and a valve positioner. One compact unit for temperature or pressure control and quick, accurate valve positioning. Check details here. Then send for Bulletin FO29 today!



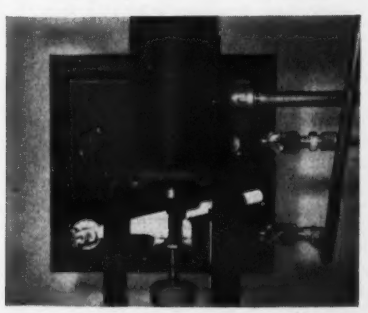
The unit can have its measuring element directly connected to the process. Or, as shown in diagram, it can be a pneumatic receiver for use with all makes of pneumatic transmitters. This permits additional indicating or recording at a remote panel board, as well as indication of the variable at the valve.



Eliminates second unit! Valve-mounted close to the process, the USG Pilot-Positioner minimizes transmission lags, provides higher precision and speed in valve action. Need for separate valve positioner is eliminated, cutting initial cost of two controls and saving on installation and maintenance. Unit fits any standard diaphragm motor valve.



New non-bleed relay. Faster, more accurate and positive positioning action is assured with a new USG-designed, high capacity non-bleed relay. A control by-pass panel with manual-automatic-service positions is offered as an option, mounting underneath the instrument case. Another option permits remote pneumatic set point adjustment.



Mechanical feedback; one air supply. The new Pilot-Positioner employs mechanical feedback through a lever system. Controller's pneumatic components are used to amplify air pressure. Only one air supply required and pressure can be as high as 65 psi. Adjustable for valve stem travels from ⅜ in. to 4 in. Valves can be air-to-open or air-to-close.

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USG®

Check 2430 opposite last page.

NEW LITERATURE
Process Instrumentation and Laboratory Apparatus

Leak detectors used for testing of both vacuum and pressure systems are described in four-page brochure. Flow diagram, photographs, and descriptions of accessories are included. Bul 1830—Analytical and Control Instrument Division, Consolidated Electrodynamics Corporation, 360 Sierra Madre Villa, Pasadena, Calif.

Check 2431 opposite last page.

Freezedryers and accessories are described and new models introduced in 40-page Freeze-Drying Cat—Arthur S. LaPine and Company, 6001 S. Knox Ave., Chicago 29, Illinois.

Check 2432 opposite last page.

Selector stations are described in detail and classified according to application in four-page Product Specification P99-1—Bailey Meter Company, 1050 Ivanhoe Rd., Cleveland 10, Ohio.

Check 2433 opposite last page.

Flowmeters, ranging from small purge meters to laboratory rotameters and calibrators, are reviewed in eight-page Flowmeter Bul—Matheson Company, PO Box 85, East Rutherford, N.J.

Check 2434 opposite last page.

Labware fabricated of lightweight and chemical-resistant plastic is illustrated in 24-page Cat H-459—General Scientific Equipment Company, Limekiln Pike and Williams Ave., Philadelphia 50, Pa.

Check 2435 opposite last page.

Pulse generator consisting of 256 steps is subject of one-page bulletin which covers principle of operation and gives specification and performance data. Form 3022-9—The Victoreen Instrument Company, 5806 Hough Ave., Cleveland 3, Ohio.

Check 2436 opposite last page.

Disposable labware is included with other laboratory benchware in 24-page Cat P59—Will Corporation, Box 1050, Rochester 3, New York.

Check 2437 opposite last page.

Input scanner which can scan up to 400 individual points—and 1000 points with slave unit—is described in Bul 19-46—KIN TEL Division, Cohu Electronics, 5725 Kearny Villa Rd., San Diego 12, California.

Check 2438 opposite last page.

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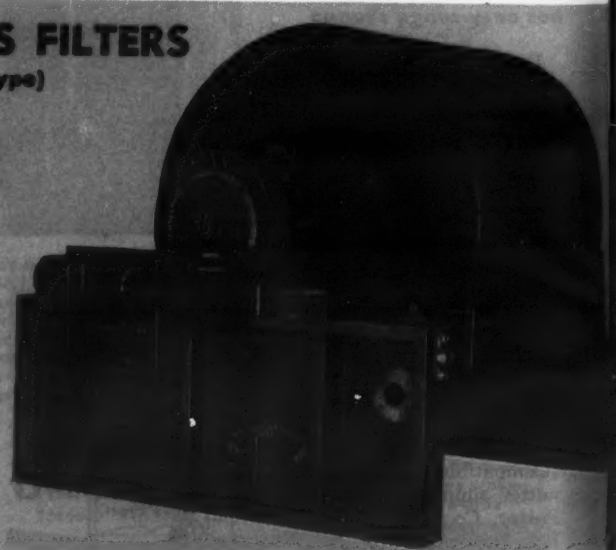

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Check 2439 opposite last page.

Pulp refiner which incorporates many features of large refiners and simulates uniform end products obtained from larger machines, is depicted in four-page Bul 17-B—Sprout, Waldron and Co., Inc., 130 Logan St., Muncy, Pennsylvania.

Check 2440 opposite last page.

Thermocouples, components and accessories are described and applications cited in Cat EN-S2—Leeds & Northrup Company, 4934 Stenton Ave., Philadelphia 44, Pa.

Check 2441 opposite last page.

Laboratory centrifuges, homogenizers, ultra-microtomes, and other instruments and accessories are itemized in 12-page General Cat 1959—Ivan Sorvall, Inc., Norwalk, Conn.

Check 2442 opposite last page.

Time-delay relays are described and data given on circuit design, manufacturing and assembly process, and specifications for standard and special-types in eight-page illustrated Bul 5903—Tempo Instrument Incorporated, Box 338, Hicksville, N.Y.

Check 2443 opposite last page.

Time-cycle controller which has improved impulse-sequence is discussed in 12-page Bul C311—The Bristol Company, Waterbury 20, Connecticut.

Check 2444 opposite last page.

Consistency control—a new concept in which a consistency regulator is used—is discussed in six-page Tech Bul 90-130-26—Fischer & Porter Company, 227 Jacksonville Rd., Hatboro, Pa.

Check 2445 opposite last page.

Control system which coordinates supervision and production activities from a central point in manufacturing plants is described in six-page Bul H-201—Telecontrol Division, Hancock Industries, Inc., 2137 Book Building, Detroit 26, Michigan.

Check 2446 opposite last page.

Crossbar scanner which is self-stepping is introduced in Bul 58-217—James Cunningham, Son & Co., Inc., 100 Litchfield St., Rochester 8, New York.

Check 2447 opposite last page.

"Understanding Transistors" is title of 64-page handbook for the newcomer to transistors. It may be purchased for 50c from Allied Radio Corporation, 100 N. Western Ave., Chicago 80, Ill.

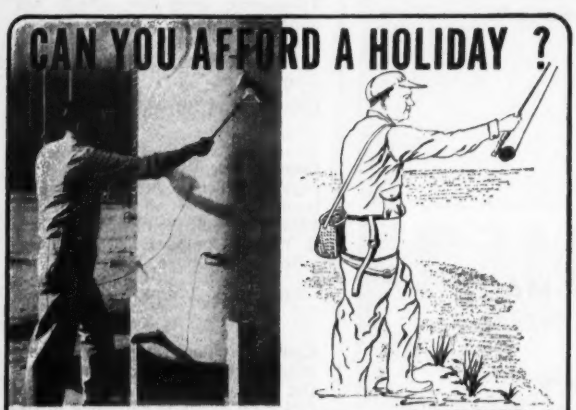
A simple, direct reading on the Alnor Velometer gives you an instant measure of air flow speed through grilles, ducts, furnaces, spray booths, or in the open.

Precision-built and self-contained, this portable instrument brings laboratory standards to the line or field installation. Available in a wide variety of scale ranges, full assortment of jets and fittings. You'll want all the facts (no safety department should be without a Velometer). Get Bulletin 2448-G. Attach this ad to your letterhead and mail to: Illinois Testing Laboratories, Inc., Room 504, 420 No. LaSalle St., Chicago 10, Illinois.

PRECISION INSTRUMENTS FOR EVERY INDUSTRY

Alnor

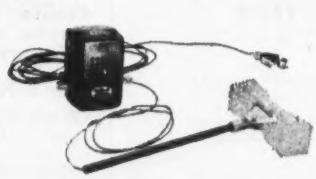
Check 2448 opposite last page.



YES . . . on the money you save with TINKER & RASOR holiday detectors.

The M-1 is an approved inspection device that accurately and quickly locates pin-holes and bare spots. The M-1 is completely portable and may be used by any workmen on the job. The audible signal is powered by dry-cell batteries and makes a simple, positive indication of voids.

DISTRIBUTORS:
Crutcher-Rolfs-Cummings Inc., Houston, Texas • Remco Manufacturing Co., Inc., Tulsa, Oklahoma • Canadian Equipment Sales & Service Ltd., Edmonton, Alberta, Canada • Bob Herrick, Rentals & Service, New Cumberland, Pennsylvania • Falcon Line Products Corp., Kearny, New Jersey • Export Agents: Frazar & Hansen Ltd., San Francisco, California



Electric Detectors for every Industry

TINKER & RASOR
417 Agostino Road, P. O. Box 281, San Gabriel, Calif.

Check 2449 opposite last page.

INSTRUMENTS & LAB

Flowmeter which operates on same principle as turbine used in power plant or turbo-prop jet is summarized in 12-page illustrated Bul OG-417—Meter and Valve Division, Rockwell Manufacturing Company, 400 N. Lexington Ave., Pittsburgh 8, Pa.

Check 2450 opposite last page.

Questions about careers in instrument and controls industry which are likely to be posed by science and engineering students and vocational guidance counselors are answered in Career Brochure—Recorder-Controller Section, Scientific Apparatus Makers Association, 370 Lexington Ave., New York 17, N.Y.

Check 2451 opposite last page.

Electronic components for industrial users are covered in detail in Cat 70 — Newark Electric Company, 223 W. Madison St., Chicago 6, Ill.

Check 2452 opposite last page.

Instrument components are cataloged in 416-page pocket-size booklet. More than 10,000 items, including gears, shafts, collars, couplings, speed reducers, differentials and other precision items, are presented with text and drawings in Cat 20a—PIC Design Corp., subsidiary of Benrus Watch Company, Inc., 477 Atlantic Ave., East Rockaway, L.I., N.Y.

Check 2453 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

Bridges and controllers, both battery- and line-operated, are thoroughly discussed in 25-page Controller Manual — Industrial Instruments, Inc., 89 Commerce Rd., Cedar Grove, N.J.

Check 2454 opposite last page.

Control valves, fabricated of ductile iron, are introduced in four-page Bul J-DI — OPW-Jordan, 6013 Wiehe Rd., Cincinnati 13, Ohio.

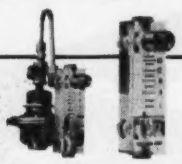
Check 2455 opposite last page.

Meter selection for any given application and for any liquid that can be metered is simplified in 20-page catalog. Additional data are included to facilitate use of meters in measurement of any of 200 liquids. Bul 43—Buffalo Meter Co., 2892 Main St., Buffalo, N.Y.

Check 2456 opposite last page.

Low Cost
PURGE METERS
***Simple *Safe**
***Sure**

New Series C M acrylic plastic PURGE METERS have been developed for all purging applications requiring a positive flow indication and maximum reproducibility of small flow conditions. Drilled, reamed and polished, these precision engineered units provide the ideal method of inexpensively measuring small gas or liquid flows where high accuracy is not paramount. Etched scales permit direct, easy readings and advanced flow control valve offers improved convenient control. Solid, one piece construction insures trouble-free operation. From $5.00.



Send for Bulletin 0100

C MAR corporation
35 Euclid Avenue, Manasquan, N. J.
EXPORT DIVISION: Empire State Bldg., N. Y. 1, N. Y.

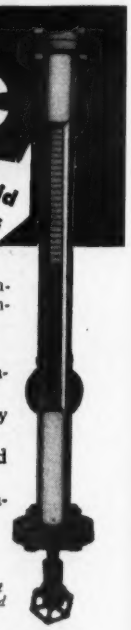
Check 2457 opposite last page.

the New Jerguson
MAGNETIC GAGE
for liquid levels

An important advancement in liquid level observation for plants with dangerous explosive or inflammable conditions.

- **Safety design seals against escaping gases.**
- **Measuring mechanism in stainless steel chamber.**
- **Scale mounted outside chamber; magnetically actuated through chamber wall.**
- **Distinct, accurate level shown in red contrasted with silver above.**
- **Job designed, correlating pressure, temperature, and specific gravity.**
- **Available with electric alarms.**
- **Can also be used for interface.**

Write for folder on Jerguson Magnetic Gages.



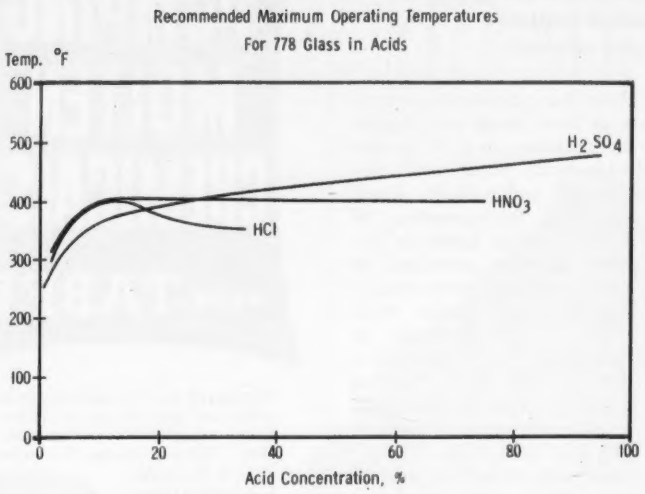
Patent Applied For

Gages and Valves for the Observation of Liquids and Levels

JERGUSON

JERGUSON GAGE & VALVE COMPANY
100 Adams Street, Burlington, Mass.
Offices in Major Cities. In Canada: Peacock Bros. Ltd.

Check 2458 opposite last page.



Glass for lining vessels withstands 75°F higher temperature

Silicate-type material also has improved corrosion resistance in both acids and alkalis

Recently developed glass for lining vessels, reactors, and their components offers outstanding advantages in both temperature and corrosion resistance. Accompanying chart shows the maximum recommended operating temperatures of the material, designated as 778 glass, to sulfuric, nitric and hydrochloric acids. This glass also has good resistance to thermoshock.

Extensive tests conducted on the silicate glass also showed it to have improved resistance to alkalis as well as excellent resistance to acids. The 778 material and corrosion-resistant laboratory glass were both exposed to 10% HCl at 350°F for 16 hours. The 778 material lost 1.14 milligrams per sq in while the laboratory glass lost 1.88 milligrams. over an equal area.

In another test both materials were heated to a temperature of 200°F in a 0.5% solution of sodium hydroxide for a period of one week. The 778 material had a loss of only 14 milligrams per sq in while the other glass lost 70 milligrams across an equal surface.

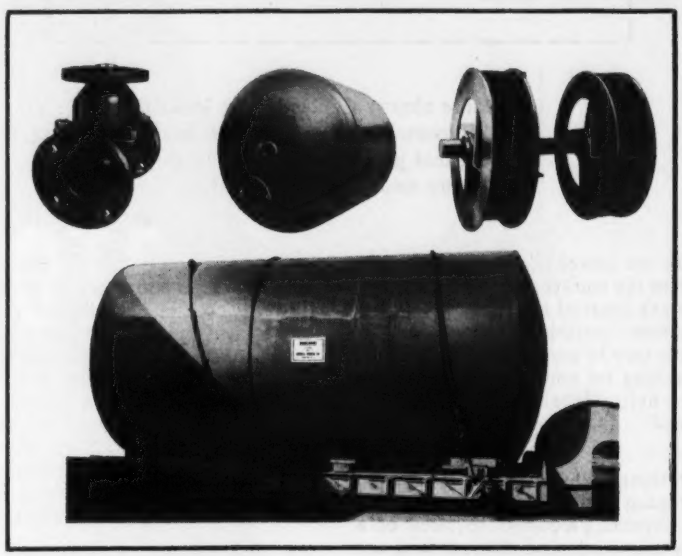
The 778 glass is not greatly different in composition than glass normally used for lining vessels except it has larger percentages of materials able to withstand high temperatures and corrosives. Coefficient of expansion is about equal to conventional glass. It can be applied to vessels with equal ease.

Reactors lined with 778 glass up to 8000 gallons in size can be furnished. Other types of vessels, columns, storage tanks, rotary dryer-blenders and other products are available lined with the 778 glass.

(The 778 glass was developed by A. O. Smith Ceramic Research Laboratories in Milwaukee in a four-year program. Further information on glass and products lined with it can be obtained from Glascote Division, A. O. Smith Corporation, 20900 St. Clair Ave., Cleveland 17, Ohio.)

Check 2459 opposite last page.

IF CORROSION IS A PROBLEM, *Talk With Goodall Engineers About* "RUBBERHIDE"



The success of "Rubberhide" Linings in providing effective, long-lasting protection against corrosion lies in the engineering experience and technical skill which Goodall is equipped to apply in producing compounds of rubber and neoprene to meet specific problems.

"RUBBERHIDE" Linings are processed to objects shipped to our Linings Plants in Trenton, Chicago or Houston; or, when the objects are too large for such shipment, or the work involves fixed plant equipment, experienced field crews do the processing "on location".

Whether factory or field processed, "RUBBERHIDE" Linings will repay many times their cost through extended life of products, parts or equipment regardless of size, shape or service requirements.

"If it's GOODALL, it MUST be Good!"

Contact Our Nearest Branch for Complete Information

See Pages 348-349, Chemical Engineering Catalog

Standard of Quality—Since 1870

HOSE · BELTING · FOOTWEAR · CLOTHING AND OTHER INDUSTRIAL RUBBER PRODUCTS

GOODALL *Rubber Company*

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BRANCHES AND DISTRIBUTORS THROUGHOUT THE UNITED STATES. IN CANADA: GOODALL RUBBER CO. OF CANADA LTD., TORONTO.

Check 2460 opposite last page.

PLASTIC PIPE AD WITH NO PICTURE?

Why no picture: Because almost all plastic pipe looks the same. You know yourself that looks can be mighty deceiving, and piping that goes wrong can be mighty expensive. A picture means nothing... but...

There are scores of brands of plastic pipe on the market... made of a dozen different kinds of materials. Most of it is labeled "corrosion-resistant" but the results may be good, bad or indifferent depending on your choice. A picture is no help. Here's what to look for instead:

The universal material? No such thing. No one plastic can handle all liquids and gases... no one has *all* the physical properties required of a truly universal pipe. Closest to it are Ace Riviclor (Rigid PVC) and Ace-Ite (rubber-plastic blend). The former is a little better on chemical resistance, the latter is a little better on impact strength and heat resistance. Both same price.

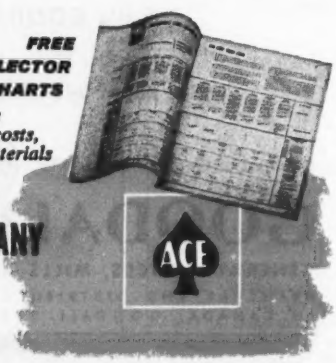
Are plastics strong enough? Thousands of chemical plants say "yes". Pipe is now available in several wall thicknesses... in flexible tube sizes (Ace-Flex clear transparent), up through gas-tubing sizes (Ace-Ite and Ace Riviclor), through flexible Supplex polyethylene pipe, and Schedules 40 and 80 rigid plastic pipe for pressures up to 490 psi.

Above that, there's Ace rubber-lined steel pipe. And don't forget Ace soft-rubber-lined pipe for resistance to abrasion.

Where do I use it? For corrosive chemicals and gases of all types. The only ones that are difficult are certain solvents and chlorinated aromatic hydrocarbons, and if you're careful to pick the right *one* of the *many* Ace materials, you can even handle most of these tough corrosives. Use plastics, too, for water lines, gas lines, electrical conduit, etc., or any lines where the pipe passes through corrosive vapors or damp areas, or goes underground.

Is there a plastic for hot corrosives? Yes, Ace Tempron, which is good to 275 deg. F. with most chemicals. Stays chemical resistant, strong, and rigid where other plastics may be attacked or may sag.

How can I dodge "trial and error"? Go to a company that has no axe to grind. We, for instance, make no less than nine different kinds of pipe ...with fittings and valves to match... and give you thoroughly unbiased advice backed by 100 years of experience and prices as low as you'll find anywhere.



FREE SELECTOR CHARTS

20 valuable pages... comparable properties, chemical resistance, costs, etc. of 11 plastics and rubber materials Write today for Bulletin CE-50.

AMERICAN HARD RUBBER COMPANY
Division of Amerace Corporation
ACE ROAD · BUTLER, NEW JERSEY

Check 2461 opposite last page.

Nonionic wetting agent makes inhibitor more effective

Uses: For prevention corrosion of iron, steel, and copper in hydrochloric acid. It is also effective with phosphoric, citric, acetic, and sulfuric acids.

Features: Incorporation of nonionic wetting agent in inhibitor permits product to provide excellent protection.

Description: Inhibitor is a balanced combination of chemical agents. Product is a yellow liquid, free flowing and soluble in water and acid solutions. The pH of concentrated inhibitor is 7.5. Recommended concentration is 2 to 3% by volume with the concentrated acid.

(O'B-Hibit-L 32 is product of O'Brien Industries, Inc., PO Box 72, Caldwell, N. J.)

Check 2462 opposite last page.

H_2SO_4 used in purifying reactor fuel is handled by stainless steel

Modifications in process help to solve corrosion problem

By modifying handling methods and utilizing corrosion-resistant No. 20-Cb stainless steel, engineers were able to cope with hot sulfuric acid used in purification of reactor fuel at Oak Ridge National Laboratory.

Problem occurred in HRT chemical processing plant of the laboratory, operated by Union Carbide Corporation for U.S. Atomic Energy Commission at Oak Ridge, Tenn.

Insoluble corrosion and fission products are removed from enriched uranyl sulphate fuel by centrifugal separation in hydraulic cyclone operated at reactor temperature and pressure. Centrifuged impurities are dissolved in hot sulfuric acid.

Solution charged from reactor to dissolver contains UO_2SO_4, $CuSO_4$, H_2SO_4; insoluble corrosion products ZrO_2, Fe_2O_3 and Cr_2O_3; and various fission products and soluble corrosion products.

By alternately refluxing sol-

PUMPING MOLTEN CHEMICALS?
write TABER

Whatever your pumping needs.. why not put it up to Taber.. long experienced pump specialists. Vertical pump illustrated, 19,478, for pumping molten chemicals. Horizontal pump, 6043, handles black liquor, caustic, etc., in evaporator service; or transfers fluids under vacuum.

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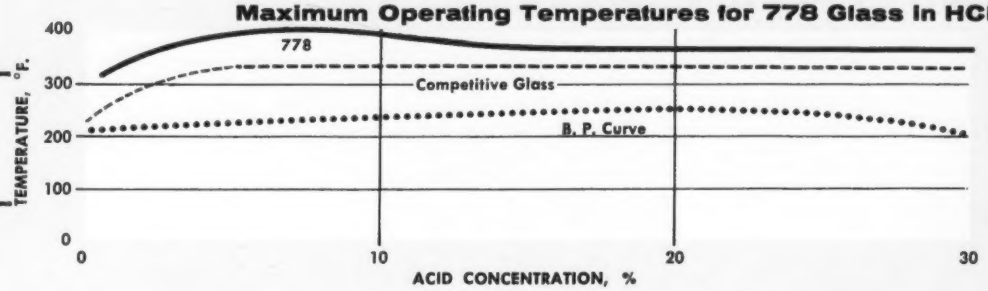
Check 2463 opposite last page.

Now! Unmatched **Glascote.**

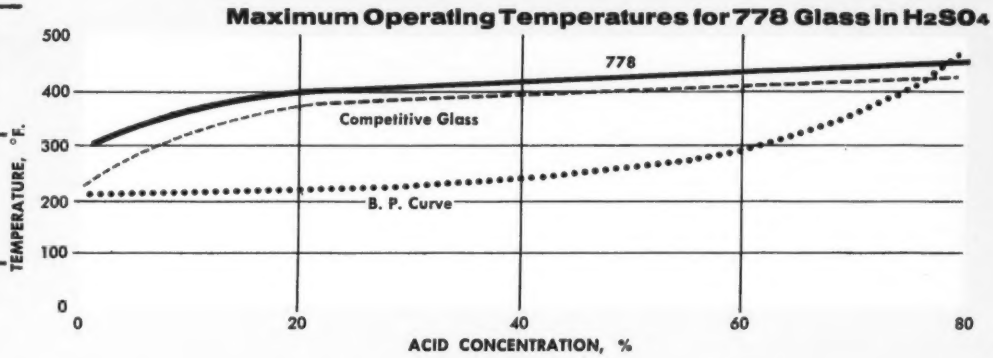
More acid-resistant at up to **75° F** higher operating temperatures

Here's graphic proof that you can speed up reaction time in vessels lined with Glascote 778. The data shown in these charts is substantiated by testing methods presented by D. K. Hoganson at the 1959 annual convention of the American Ceramic Society. We would be happy to send you more complete details on this testing procedure. Drop us a line and your request will receive prompt attention.

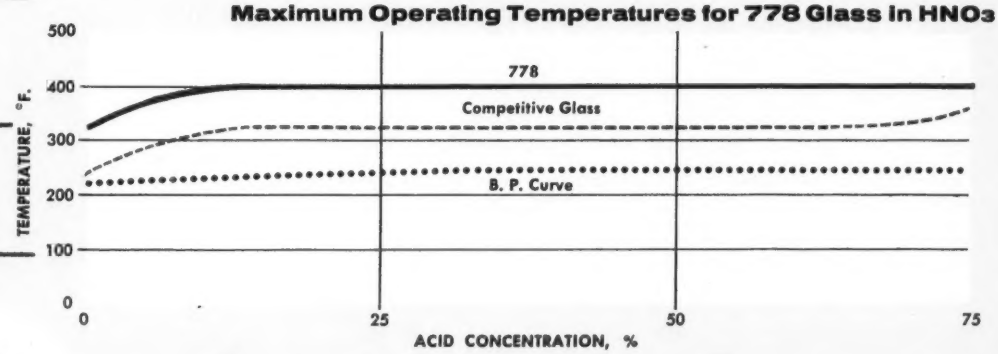
Maximum Operating Temperatures for 778 Glass in HCl

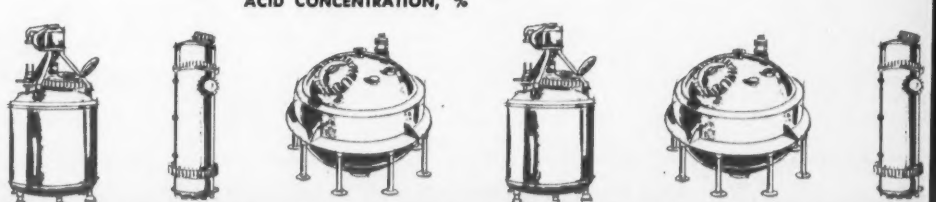


Maximum Operating Temperatures for 778 Glass in H_2SO_4



Maximum Operating Temperatures for 778 Glass in HNO_3



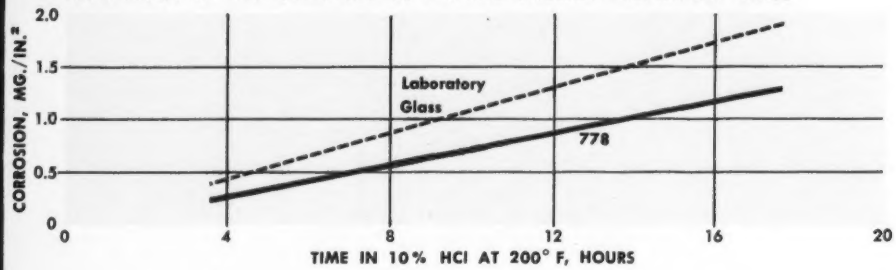


glass-lined chemical processing equipment

More corrosion and thermal shock resistant than chemical laboratory glass

MORE ACID-RESISTANT Ever think you'd see the day when glass-lined steel possessed the acid-resistance of boro-silicate type lab glass? Glascote put new 778 and lab glass to rigid quantitative acid tests — the results proved Glascote 778 not only equal but *superior* to lab glass in its ability to withstand acid corrosion.

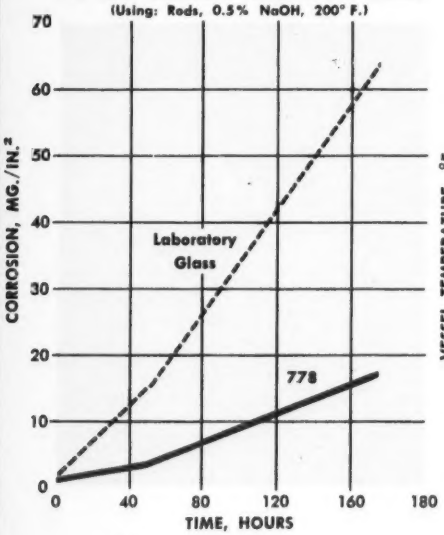
COMPARISON OF ACID CORROSION OF 778 AND CHEMICAL LABORATORY GLASS



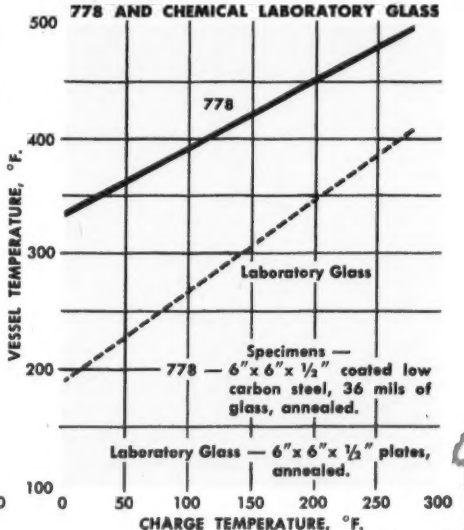
MORE ALKALI-RESISTANT Glascote 778's superior acid resistance was achieved without sacrificing any other protective property. Actually, as an alkali-resistant glass, its superiority over boro-silicate type laboratory glass is even more dramatic.

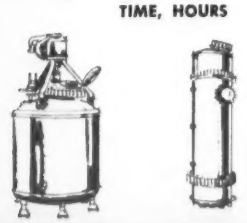
MORE THERMAL SHOCK-RESISTANT We gave Glascote 778 and untempered boro-silicate type laboratory glass shock treatment too! Heating and quenching tests show Glascote 778 able to resist thermal shock at higher temperatures. However, for applications requiring *even higher* resistance to thermal shock, we've formulated Glascote 558 — a special anti-thermal shock glass.

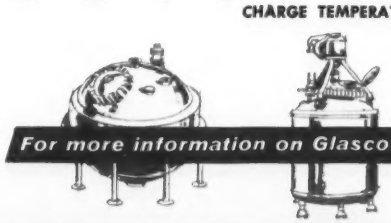
COMPARISON OF ALKALI CORROSION OF 778 AND CHEMICAL LABORATORY GLASS
(Using: Rods, 0.5% NaOH, 200° F.)

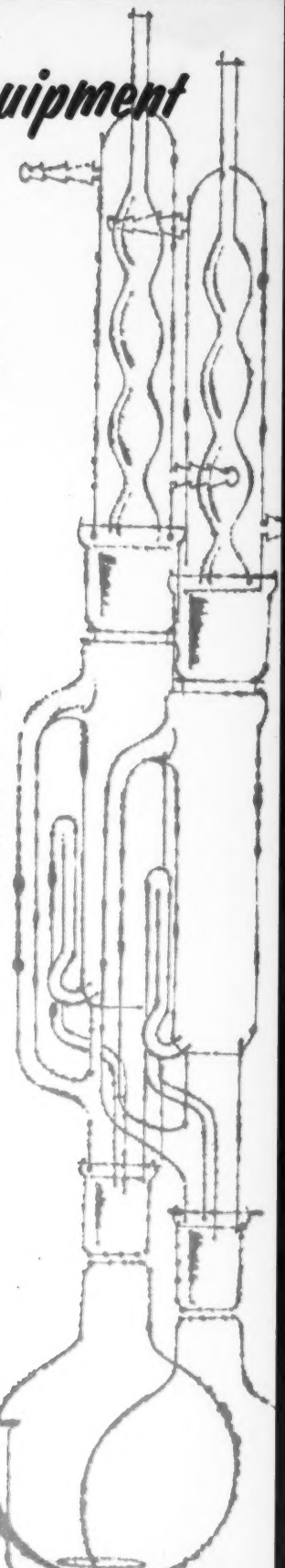


COMPARISON OF THERMAL SHOCK LIMITS OF 778 AND CHEMICAL LABORATORY GLASS



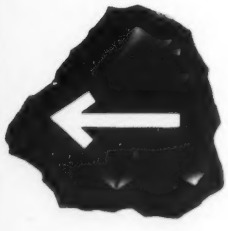




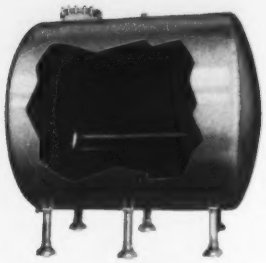


For more information on Glascote's equipment line, please turn page

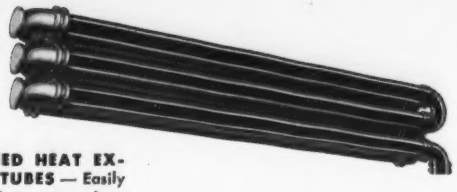
pièce de résistance



This piece of new Glascote 778 frit is
the most corrosion-resistant glass ever applied
to chemical processing equipment.



GLASS-LINED STORAGE TANKS — Single shell horizontal types and vertical units available. Plain, jacketed, open and closed. Built to your specifications.



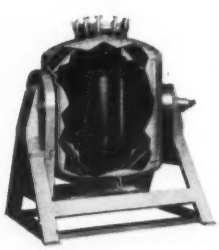
GLASS-LINED HEAT EXCHANGER TUBES — Easily assembled into corrosion-resistant heat exchangers. Standard diameter jacketed pipe, combines with elbows or return bends.

GLASS-LINED PIPE AND FITTINGS — Available in 10-ft. lengths, fittings to ASME standards, in inside diameters from 1½ to 4 in. Six and eight inch and larger sizes to order.

THESE GLASS-LINED PRODUCTS FOR THE CHEMICAL PROCESSING INDUSTRIES ARE ALL AVAILABLE WITH

GLASS-LINED REACTORS — Custom-built up to 8,000 gallons. Standard units from stock range from 300- to 2000-gallon capacities. Feature rotary mechanical seal eliminating contamination from packed stuffing boxes . . . removable blade glass-coated agitators.

GLASS-LINED COLUMNS — Standard and special packed units in glass-on-steel or alloy metals. Built to your specifications in dia. up to 60 in.



GLASS-LINED CONICAL, ROTARY DRYER-BLENDERS — Capacities 5, 35 and 110 cu. ft. as standard, and larger on request. Pressures: tank full vacuum to 25 psi, jacket 65-75 psi.

Glascote®

Glascote offers you reactors (including high pressure spherical production-size types), columns, storage tanks, rotary dryer-blenders, pipe and fittings — all available glass-lined with Glascote 778 for the best protection ever put to steel.

Glascote 778 is the newest addition to an inventory of more than 3,000 glass formulas developed by Glascote and its parent organization, A. O. Smith Corporation. For example, on those specific applications where a producer has a consistent thermal shock problem, Glascote 558 was formulated to give no-spall performance over an indefinite period of time. And this same Glascote 558 is also industry's most abrasion- and mechanical impact-resistant glass.

The equipment shown on this page is typical of many products supplied for laboratory, pilot plant and full scale commercial production, engineered and fabricated to your exacting specifications.

Ask the representative who calls on you for all the facts on Glascote products. Or if you prefer, write direct: Glascote Products, Inc., Cleveland 17, Ohio.

Glascote®

PRODUCTS, INC.

CLEVELAND 17, OHIO

Sales offices or agents in principal cities. Export Sales:
A. O. Smith INTERNATIONAL S. A., Milwaukee 1, Wisconsin, U. S. A.

A SUBSIDIARY OF **A. O. SMITH** CORPORATION • *World's largest manufacturer of glass-protected steel products*

Litho in U. S. A.

ids in 10.8M H_2SO_4 and 4M H_2SO_4 in tantalum-lined batch dissolver, layer of oxide on each particle is converted to sulphate which readily dissolves in dilute acid.

Dissolved solution is pressurized to sampler by boiling. After sampling, solution is again pressurized and transferred to one of two 90-gallon decay tanks. Dissolver is washed and rinse also transferred to decay tank.

Thirteen weekly batches and rinses are accumulated in tank. During holding period, solution is occasionally boiled to evaporate rinse and bring solution concentration back to 4M. Otherwise, temperature is kept at 100°F.

Solution in filled tank is held 13 weeks to permit many fission products to decay out; then solution is dropped in batches to six-gallon transfer tank, and pressurized by boiling to shielded external carrier.

No. 20-Cb stainless steel was used for two decay tanks, transfer tank, sample tank, dissolver head, several coolers, and all process lines involved with hot H_2SO_4.

In tests, corrosion rate of steel was 1.5 mpy in boiling solution with oxygen present. At 100°F, corrosion rate was 0.4 mpy.

Since corrosion rate increased at higher temperatures, coolers were installed to cool hot solution pressurized from dissolver and transfer tank. Instead of boiling solution to provide steam for diluting explosive gaseous mixture resulting from recombining of radiolytic H_2 and O_2, steady diluting circulation of air is maintained by thermal convection. Air helps to cool decay tanks.

(No. 20-Cb stainless steel was furnished by Alloy Tube Division of The Carpenter Steel Co., Union, N.J.)

Check 2464 opposite last page.

For more information on product at left, specify 2465 . . . see information request blank opposite last page.

the **WALWORTH CUSTOMER** *wants* **PLASTIC VALVES** *and* **FITTINGS** *that can't corrode . . . here's how he gets them*

When the Walworth Customer is faced with the control of corrosive fluids, he looks at dozens of plastic valves and checks them for himself. He demands answers to questions like these: Can this valve corrode? Is it toxic? Is it non-aging? In Walworth PVC Valves and Fittings, the Walworth Customer finds his answers. Not only is PVC nontoxic and non-aging, – it *can't* corrode. *All* parts are made of plastic. Valves and fittings have high burst strength. Given those facts the Walworth Customer buys.

That may be the way you like to buy valves, too. If you insist on knowing about materials, workmanship and high quality, we'd like you for a Walworth Customer, too. For the newest literature on the complete line of PVC Valves and Fittings, get in touch with your Walworth Distributor.

Or write **WALWORTH** *750 Third Avenue, New York 17, N. Y.*

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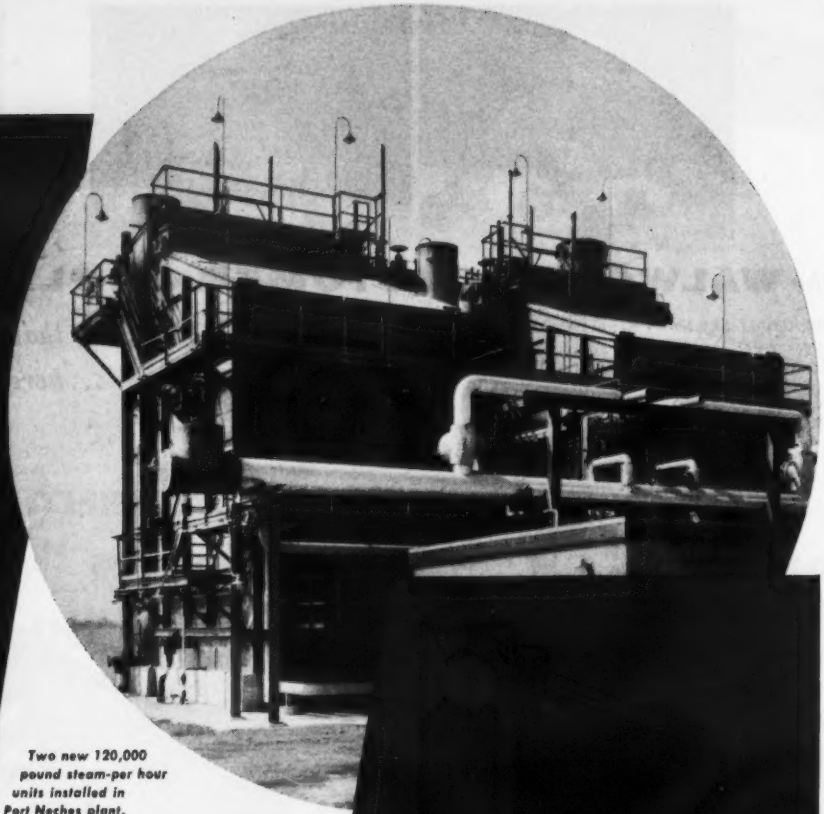
Check 2466 opposite last page.

Steam for Jefferson Chemical by Vogt

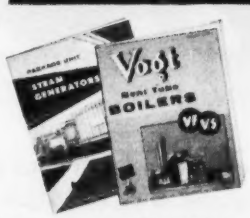


Two new 120,000 pound steam-per hour units installed in Port Neches plant.

The needed additional power and process steam capacity for Jefferson Chemical's expanded Port Neches plant is furnished by the two Vogt boilers pictured here, each with a capacity of 120,000 pounds per hour. The boilers are designed for 675 lbs. pressure to operate at 625 lbs. pressure and 769°F. total temperature. The furnaces are equipped with gas burners and have water cooled front and side walls.

Bulletins describing Vogt boiler installations in a variety of industrial plants for power, processing and heating are available on request.

Installation by C. F. Braun and Co., Engineers.



For Custom Installation Bulletin VF-VS-2 • Package Unit Bulletin PSG-3, address Dept. 24A-BCP.

HENRY VOGT MACHINE CO., LOUISVILLE, KENTUCKY

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STEAM GENERATORS

Check 2467 opposite last page.

Pump corrosion reduced by proper selection of materials

Paper discusses aspects of design problems

By proper design and choice of construction materials for centrifugal and diaphragm pumps, it is possible to reduce effects of corrosion, erosion, fatigue and simple wear.

Sealless Pumps

With diaphragm-type pumps there is no shaft-sealing problem. Solids in suspension can be handled at relatively low velocities. Also, high degree of corrosion resistance can be obtained by use of alloy steels or lined castings for pump body and synthetic rubbers for diaphragms.

Critical working parts of this type of pump are diaphragms and check valves. Diaphragms can usually be made of same material used for pump linings.

Check valves represent important part of diaphragm pumping unit. These can be of ball, poppet or pinch types. For slurry application, ball and pinch types give best service. Both lend themselves to use of synthetic rubber parts or linings.

Where hazardous, radioactive or expensive liquids are being handled, a hydraulically operated diaphragm pump is recommended. Since air-operated diaphragm pumps do not have balanced pressures acting on diaphragm, their usage is limited to discharge heads of 100 to 150 psi.

In nuclear reactor service, hydraulically actuated diaphragm pumps have been developed as feed pumps, supplying small quantities of slurry at 2000 psi. Where capacity is small, specially designed stainless steel diaphragms can be provided which permit operation at temperatures above 400°F.

Canned-motor centrifugal pumps are usually not applied where liquid contains large percentage of solids. This is because of close clearance and

possibility of damage to bearings by abrasion. Such pumps have been developed in large sizes, up to 700 hp, for handling molten sodium and sodium-potassium mixtures in nuclear power plants. These units have been designed to operate at temperatures between 1000 and 1400°F.

Packing Glands, Seals

In recent years, advances have been made in bolt packing-gland and mechanical-seal construction for centrifugal-pump shafts. In addition to improved designs, new materials have been developed for increased corrosion resistance.

When pumping abrasive slurries, sealing is a problem. Reversed-suction design, in combination with double mechanical seals, minimizes this difficulty.

(Condensed from paper, "Design and Materials for Reduced Pump Corrosion," delivered before 15th Annual Conference of the National Association of Corrosion Engineers by J. E. Piccardo, Dorr-Oliver Incorporated, Stamford, Conn.)

(Further information concerning various aspects of pump corrosion, erosion and wear may be obtained from Dorr-Oliver Incorporated, Stamford, Connecticut.)

Check 2468 opposite last page.

". . . therefore, automation frees the operator for more important projects."

THE PROPER WIND IN SPIRAL-WOUND

It's the precise control of gasket densities for every stage in the pressure series that makes each Flexitallic Gasket right for a given flange.

Flexitallic Spiral-Wound Gaskets are engineered to meet extreme conditions encountered in keeping with the pressure/temperature rating for the specified assembly.

These controls mean that a Flexitallic Gasket, designed for an extreme pressure/temperature rating, is never so soft that it crushes under the specified load, and never so hard that it resists the compression necessary for a specified seal.

For predictable performance throughout all pressure/temperature ratings, look for Flexitallic Blue, the blue dye in the Canadian asbestos filler. It identifies the original Spiral-Wound Gasket construction.

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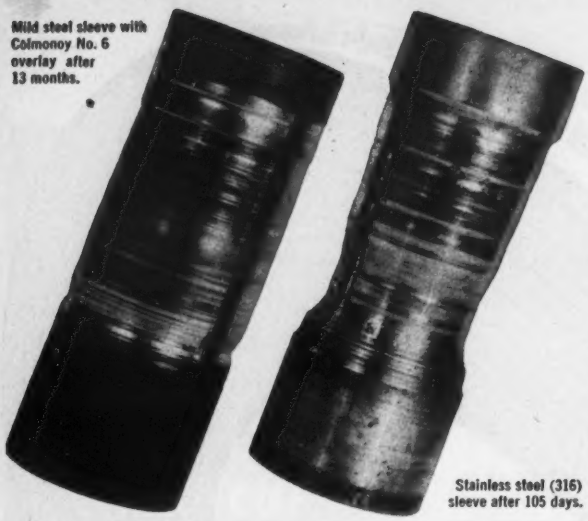
FOR PIPE FLANGES, PRESSURE VESSELS AND PROCESS EQUIPMENT

*Flexitallic is a registered tradename. No one else can make a Flexitallic Gasket. Look for *Flexitallic Blue* — it's our exclusive blue-dyed Canadian asbestos filler.

Check 2469 opposite last page.

Mild steel sleeve with Colmonoy No. 6 overlay after 13 months.

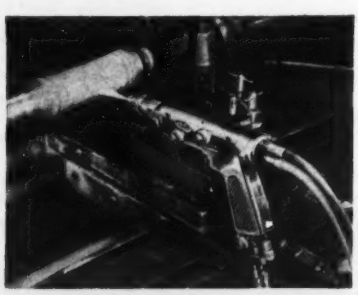


Stainless steel (316) sleeve after 105 days.

Colmonoy Hard-Surfaced Mild Steel Pump Sleeve Lasts Longer Than Stainless Steel Sleeve

Here's dramatic evidence of how Colmonoy hard-surfacing alloys can lower maintenance costs. Both pump sleeves (above) served in a Desalta charge pump, moving crude oil. The one at the right, made of 316 stainless steel, was photographed after 105 days in service (involving eight packing changes). The other one, made of mild steel with a sprayed overlay of Colmonoy No. 6 alloy, served over three times as long (with just one repacking), yet suffered much less wear.

Colmonoy No. 6 is a wear-resistant nickel-base alloy incorporating chromium borides and carbides. The powdered alloy is sprayed on with the Colmonoy Spraywelder, as shown. The smooth sprayed overlay is then fused to the base metal with an oxy-acetylene flame to form a solid, non-porous, wear-resistant overlay.



WRITE RIGHT NOW
For the Colmonoy Spraywelder Catalog and Hard-Facing Manual No. 79

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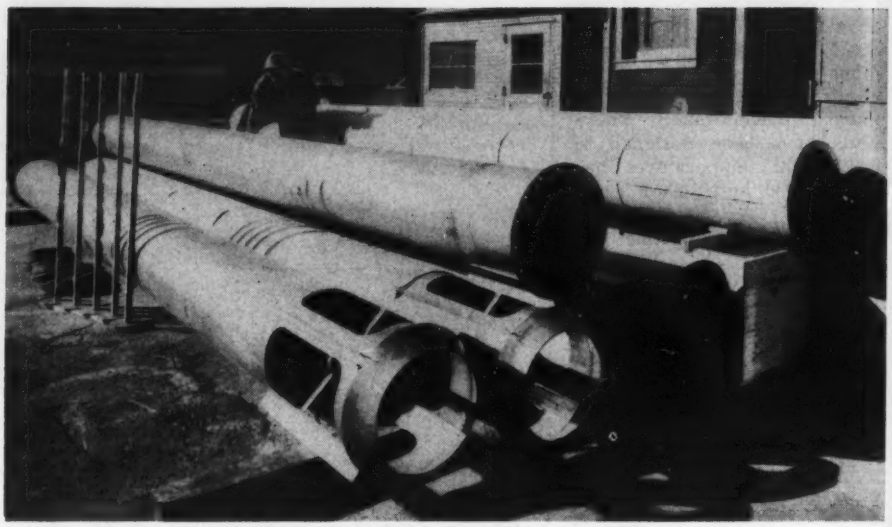
MORRISVILLE, PA. • NEW YORK • PITTSBURGH • MONTREAL • GREAT BRITAIN

Check 2470 opposite last page.



Titanium draft tubes for Freeport Nickel installation

More than 28,000 lb of titanium used at Freeport Nickel plant

Fittings, pipe, tube, valves and other equipment made from the metal withstand the highly corrosive and erosive slurries

EQUIPMENT utilizing the largest single order of titanium ever developed for a commercial application has been unveiled at Freeport Nickel Company's giant nickel extraction plant at Moa Bay, Cuba. More than 28,000 pounds of titanium is in use. Titanium proved to be the most practical material capable of resisting the highly corrosive and eroding slurries of cobalt, nickel, and sulfuric acid at elevated temperatures and pressures.

Titanium is used for draft tubes, valves, piping, internals and nozzle linings for Freeport's 55-foot, 106-ton leaching reactors where nickel and cobalt are extracted from lateritic nickel ores by acid leaching.

Titanium was specified for the "bleed steam" system for the reactor vessels. The metal is used for fittings and piping for the bleed steam lines to overcome a critical stress corrosion problem that occurred in all highly stressed zones. The "bleed steam" is the steam injected into the vessel for agitation, which then must be drawn off for use in preheating the feed slurry.

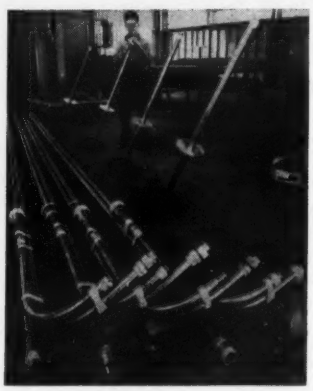
Another use of titanium involved the method of bringing a sulfuric acid injection line to and through the leaching reactor vessel. In this case, a stainless steel pipe carries the acid to the vessel where it is joined by a plate flange to a titanium "armor" pipe inside. In addition, a titanium "thimble" was used to protect the lead lining of the small vessel nozzle from mechanical damage, and to give support against creep.

Again, in the "cooler-boiler" unit — in a shell-and-tube heat exchanger operated like a low-pressure fire-tube boiler — titanium is used for the tubes. This unit is used to recover a substantial part of the heat content of the leached slurry. Titanium is particularly important here since there is a contraction in volume

and an increase in viscosity of the corrosive slurry between the heat exchanger. Slurry velocities in the tubing are 6 ft/sec maximum. Design velocity is 4 ft/sec. According to Freeport engineers, only titanium was able to withstand these conditions.

The titanium grade utilized in virtually every application was RS-55 — an intermediate strength, commercially pure grade.

Freeport's leach solutions contain from 2 to 5% free sulfuric acid; nickel, aluminum, magnesium, and manganese sulphates in concentrations up to 1% by weight of solution; and small amounts of cobalt, iron, copper, zinc and



Titanium pipe for use within leaching reactors

hexavalent chromium. At temperatures of 500°F, and pressures on the order of 500 psi, the titanium shows a corrosion rate of essentially zero.

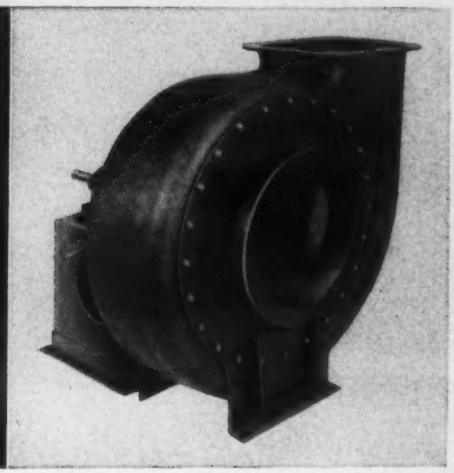
Freeport plans to produce 50,000,000 pounds of nickel per year, at 6300 tons of ore per day. To attain this rate, the company has split its operation into two plants — the Moa Bay unit, to treat the ore to produce a "shipping concentrate," and a refinery at Port Nickel, La., to produce pure nickel and cobalt from the concentrate.

Titanium is also used in the leaching system of the Port Nickel refinery, where it shows the same resistance to corrosion and erosion as in the Moa Bay system. Freeport engineers indicate that

CORROSIVE FUMES?

HANDLE THEM WITH THESE SPECIAL "BUFFALO" FANS

"Buffalo" Cast Iron Exhauster



"Buffalo" Fiber Glass Fume Fan

"Buffalo" Cast Iron Exhausters are built to withstand extreme corrosive conditions in the chemical process industries. High efficiency is the result of low-turbulence air flow design. This includes heavy-duty cast iron housings and cast inlet cones with integral inlet vanes. Non-overloading characteristics are preserved despite changes in system pressure. Available with direct motor drive, separate belt drive or package unit with adjustable pitch V-belt drive and motor mounted on adjustable base rails. Write us for full information.

"Buffalo" Resin-Bonded Fiber Glass Fume Fans are highly resistant to such chemical corrosives as acids, salts, gases, organic materials and others. They are suitable for temperature applications up to 300°F. The fan housing is constructed entirely of fiber glass. All exposed parts of the factory-balanced rotor are encased in thick fiber glass. Standard capacities range up to 34,000 cfm at pressures to 10" static. Investigate the advantages of "Buffalo" Type "FG" Fume Fans — versatility, lighter weight, reasonable cost, dependability. Write for Bulletin FI-511.

These two specialized fans are representative of the air handling units engineered by the Buffalo Forge Company to help you combat the corrosive fumes encountered in many industrial processes. In addition to these fans, "Buffalo" offers rubber lined fans, fans with other special coatings and a comprehensive line of air cleaning units.

For complete details on "Buffalo" corrosive fume handling units, contact your "Buffalo" engineering representative or write us direct.

"Buffalo"

BUFFALO FORGE COMPANY

BUFFALO, NEW YORK

Buffalo Pumps Division, Buffalo, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

VENTILATING • AIR CLEANING • AIR TEMPERING • INDUCED DRAFT • EXHAUSTING • FORCED DRAFT • COOLING • HEATING • PRESSURE BLOWING

Check 2471 opposite last page.

while temperatures are somewhat lower in the Port Nickel leaching operation, nickel-cobalt sulfide is oxidized to sulphates with high-pressure air in an acid medium. Solutions contain 1.5 to 2.0% of free sulfuric acids, and over 10% dissolved nickel sulfate. Also, a large excess of unreacted nickel-cobalt sulfide is in suspension.

(Titanium valves and piping assemblies were fabricated by Crane Co., in Chicago. Nooter Corporation in St. Louis roll-formed titanium from plate into pipe for use as draft tubes, internals and nozzle linings.)

(R-55 titanium is product of Republic Steel Corporation, 1441 Republic Bldg., Cleveland 1, Ohio.)

Check 2473 opposite last page.

Zirconium sheet for hot acids

Announcement is made of expanded zirconium sheet for handling strong or hot phosphoric, hydrochloric, or sulfuric acid solutions. Material will be available in thicknesses from 0.020 to 0.125". Either unflattened or flattened mesh can be furnished.

(Expanded zirconium sheet is product of Mallory Sharon Metals Corp., Niles, Ohio.)

Check 2474 opposite last page.

Application simplified with one-part coating

Uses: Protects metal, wood, concrete, cloth and some plastics against chemicals, abrasion and weathering.

Features: Coating has gel-type consistency and can be applied by brush without priming, stirring, diluting or adding curative agent, thus reducing application costs. Air-cures to tough rubbery film which protects against a variety of products.

Description: Neoprene-rubber-based coating adheres well to unprimed steel, aluminum, copper, galvanized steel, concrete, wood and glass-

MANHATTAN ACID-PROOF RUBBER LINING PROTECTS WORLD'S LARGEST VACUUM DEAERATOR

This deaerator is designed for removal of all minerals and silica from boiler make-up water at the nation's largest ion-exchange processing installation . . . and protected *permanently* against corrosion, contamination and abrasion with Manhattan Rubber Lining! Giant 52,000 gallon capacity is no problem for R/M lining specialists. If a unit can be shipped, it can be handled at a Raybestos-Manhattan rubber lining plant . . . equipment too large to ship is field lined and vulcanized by experienced and supervised crews.

The most modern facilities available today—*plus* experience dating back to the first tank lined in this country—are ready to assure the best possible lining job for your equipment at Raybestos-Manhattan. Manhattan Acid-Proof Rubber Linings are made from thick, multiple calendered sheets of natural or synthetic rubber for utmost protection and durability. Lining expands and contracts with metal under temperature change . . . won't harden or crack. Manhattan Rubber Lining is bonded to metal so securely tests have proved they can't be separated! Resistance to most acids and alkalis is as positive as advanced technology can provide. To make certain your equipment lining is flawless *and* permanent . . . every Raybestos-Manhattan Lined Tank is tested under high voltage.

Be sure your costly equipment and solutions get the *complete* protection your investment demands . . . discuss your lining requirements with an R/M representative nearest you.

- Multiple Calendered Sheets
- Permanent Protection Against Corrosion, Contamination
- Permanent Rubber-to-Metal Bond
- Resistant to Acids, Alkalis, Abrasion, Temperature
- Largest Facilities . . . Longest Experience
- Rubber Lining Plants at Passaic, N.J., North Charleston, S.C.

RM-804

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Check 2472 opposite last page.

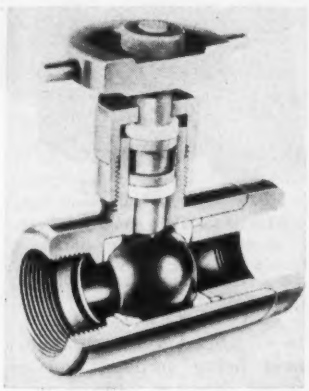
fiber-reinforced polyester plastics.

It resists 20% concentration of hydrochloric and sulfuric acids, distilled and salt water, and alkalis at continuous-service temps up to 120°F.

Coating remains in position until it dries, even on vertical surfaces.

(Coro-gard 1706 is a product of Adhesives, Coatings and Sealers Division, Minnesota Mining and Manufacturing Co., 900 Bush Ave., St. Paul 6, Minnesota.)

Check 2475 opposite last page.



Rigid vinyl ball valves

. . . have been successfully used in piping systems where corrosion has been problem. Material resists oils, acids, alkalis, and most chemicals. Fabricated of vinyl, except for seats and seals, valves have proved effective either at full pressure or vacuum, according to manufacturer.

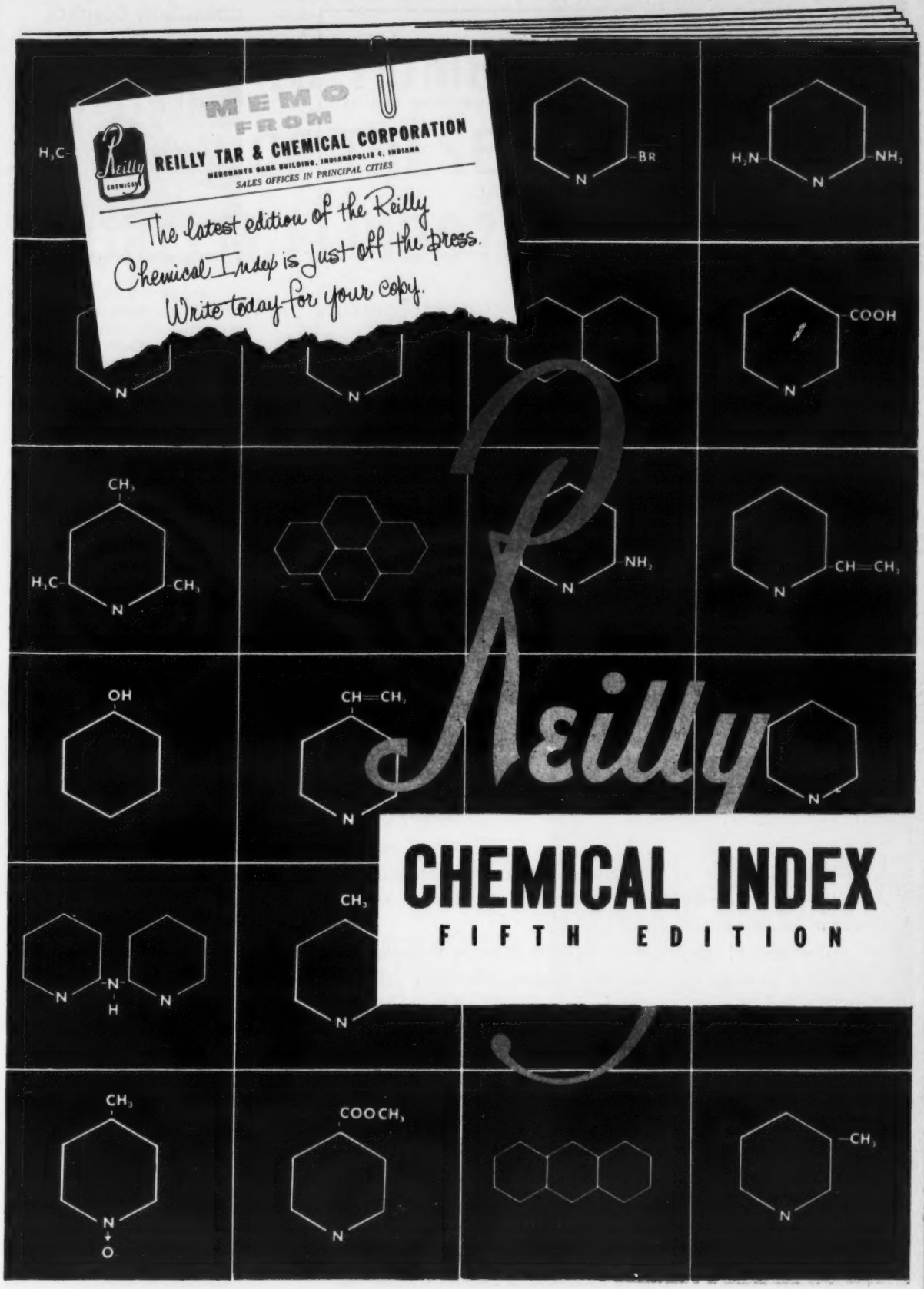
Self-compensating for changes in pressure or temperature, vinyl valves are available with threaded ends, weld ends, or flanges. They do not require lubrication.

(Rigid vinyl ball valves are manufactured by Jamesbury Corporation, 45 New St., Worcester 8, Mass.)

Check 2476 opposite last page.

(Geon vinyl is product of B. F. Goodrich Chemical Company, division of The B. F. Goodrich Company, 3135 Euclid Ave., Cleveland 15, Ohio.)

Check 2477 opposite last page.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AMCHEM PRODUCTS, INC., AMBLER 38, PA.

Please send me "Data File" and Selection Chart describing uses of Rodine Inhibitors for Industrial cleaning.

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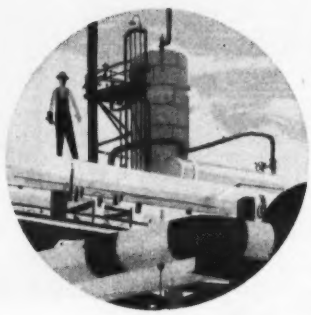
CLIP THIS COUPON . . .

for **SELECTION CHART** on Rodine Acid Inhibitors for **INDUSTRIAL CLEANING!**



Now—available for the first time—a handy selection guide to let you easily determine the proper class of inhibitors to use for various metals and cleaning media!

Rodine Acid Inhibitors are ideal for all types of specialized industrial cleaning requirements. Rodine effectively inhibits acid solvents used to dissolve deposits in industrial equipment, tanks, and piping systems. Find out how Rodine can protect your investment in costly equipment by eliminating acid erosion.

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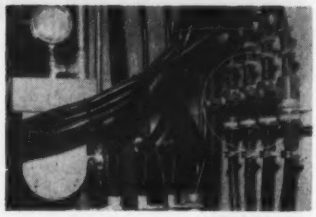


Twenty vital functions

. . . are served by ball valves with Teflon seats and seals in color film and print processing line at Rich Color Laboratory in Worcester, Mass.

Used to transfer chemicals such as ferricyanide bleach and acetic acid from mixing room to processing tanks, ⅜" valves are made of polyvinyl chloride.

Self-cleaning "ball" action of valves readily passes chemicals even after long periods of relative inactivity, according to laboratory supervisor.

(PVC Double-seal ball valves are product of Jamesbury Corp., 65 New St., Worcester, Massachusetts.)

Check 2479 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

Spray nozzles unharmed by twin corrosion attack

Scrubbers, utilizing spraying equipment incorporating nozzles of silicon-nitride-bonded silicon carbide, are being successfully used by producers of sulfuric acid and sulfur phosphate.

Sulfuric acid producers are utilizing the units in purification systems or in scrubbing gases coming from roasters. Liquid sprayed is usually highly abrasive iron oxide slurry. Also, nozzles are subjected to corrosive effects of sulfuric acid fumes. In this type of service they have proved to be superior to spray nozzles made of various alloys.

Silicon carbide nozzles have also been in successful cooling and purifying use in sulfuric acid producing plants.

A third satisfactory application of these spray nozzles is in scrubbing gases, liberated in combining sulfuric acid with phosphate rock to produce sulfur phosphate. In this instance, nozzles are subjected to effects of hydrofluorosilicic acid being sprayed and external corrosive atmosphere.

Spray nozzles of silicon-carbide have successfully resisted effects of acids sprayed through them and external corrosive atmospheres

(Refrax spray nozzles are sold by Spray Engineering Co., 100 Cambridge St., Burlington, Massachusetts.)

Check 2480 opposite last page.

(Refrax spray nozzles are produced by Refractories Division, The Carborundum Co., Perth Amboy, N. J.)

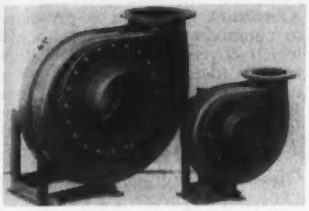
Check 2481 opposite last page.

Low-pressure polyethylene used for fan wheels of PVC blowers

Uses: Suction, blowing, ventilating and exhausting in situations where resistance to acids and corrosive gases is factor.

Features: Injection-molded fan wheels are fabricated of low-pressure polyethylene. Production costs are reduced by using molding process.

Description: Blowers are equipped with iron pedestals



Fan wheels of blowers are molded of low-pressure polyethylene

and motors — smaller sizes are connected directly with integral motors while larger ones are equipped with belts. Cases are made of pressed PVC; cover plates fastened by stainless screws and nuts.

Larger sizes have welded wheels made of low-pressure polyethylene.

(PVC blowers are development of Milo Manufacturing Co., 325 North Broad St., Elizabeth, N.J.)

Check 2482 opposite last page.

NEW LITERATURE
Corrosion Control

Chemical-resistant wood for fabrication of processing equipment is discussed in four-page brochure. Wood is impregnated with a monomeric solution of furfuryl alcohol and a catalyst. "Kofural" bul— Wood Preserving Division, Koppers Co., Inc., Pittsburgh 19, Pa.

Check 2483 opposite last page.

Expansion joints in various applications are cited in eight-page, illustrated Expansion Joints Bul— La Favorite Rubber Mfg. Co., 275 Wagaraw Rd., Hawthorne, New Jersey.

Check 2484 opposite last page.

Bearing bronze with good machinability and high resistance to wear and corrosion, called Ampcoloy 666, is described in Bul G53 — Ampco Metal, Inc., 1745 S. 38th St., Milwaukee 46, Wis.

Check 2485 opposite last page.

Specialty steels including a variety of stainless types, are detailed in 40-page guide for buyers — The Carpenter Steel Company, Reading, Pa.

Check 2486 opposite last page.

WANT TO PUMP ANY OF THESE PROBLEM FLUIDS?

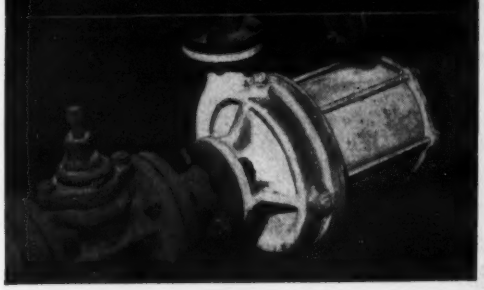
Chempump, the original "canned" pump, handles them all easily.

If you've got a problem handling volatile, toxic, explosive or other "tough" fluids, Chempump is your answer. This process-proved, maintenance-free pump can handle the tough ones with absolutely no leakage or contamination. Units available for system pressures to 5,000 psi . . . temperatures to 1,000 F. . . . capacities to 600 gpm.

Here's a pump that is built to a design evolved from years of experience in the "canned" pump field . . . many more years than any other manufacturer of similar pumps.

Only Chempump offers you proved operating performance . . . from thousands of installations in all types of services . . . plus experienced field sales engineering. Use Chempump to solve your fluid pumping problems. Write now . . . for "request for quote" data sheet . . . to Chempump Division, Fostoria Corporation, Buck and County Line Roads, Huntingdon Valley, Pa.

Acetic acid
Chlorine
Acrylonitrile
Phenol
Dowtherm
Diethanolamine
Dimethyl sulfate
Heavy water
Cyanides (toxic)
Nitric acid
Sulphite liquors
Titanium tetrachloride
Nitrogen tetroxide
Hydrazine
Formaldehyde
Boron fuels
Sodium hydroxide (less than 50%)
Toluene diisocyanate
Methyl chloride
Mercaptans
Ethylene oxide



Chempump combines pump and motor in a single, leakproof unit.
No seals, no stuffing box.
Most models U. L. approved.

Chempump

Finest in the field...*process proved*

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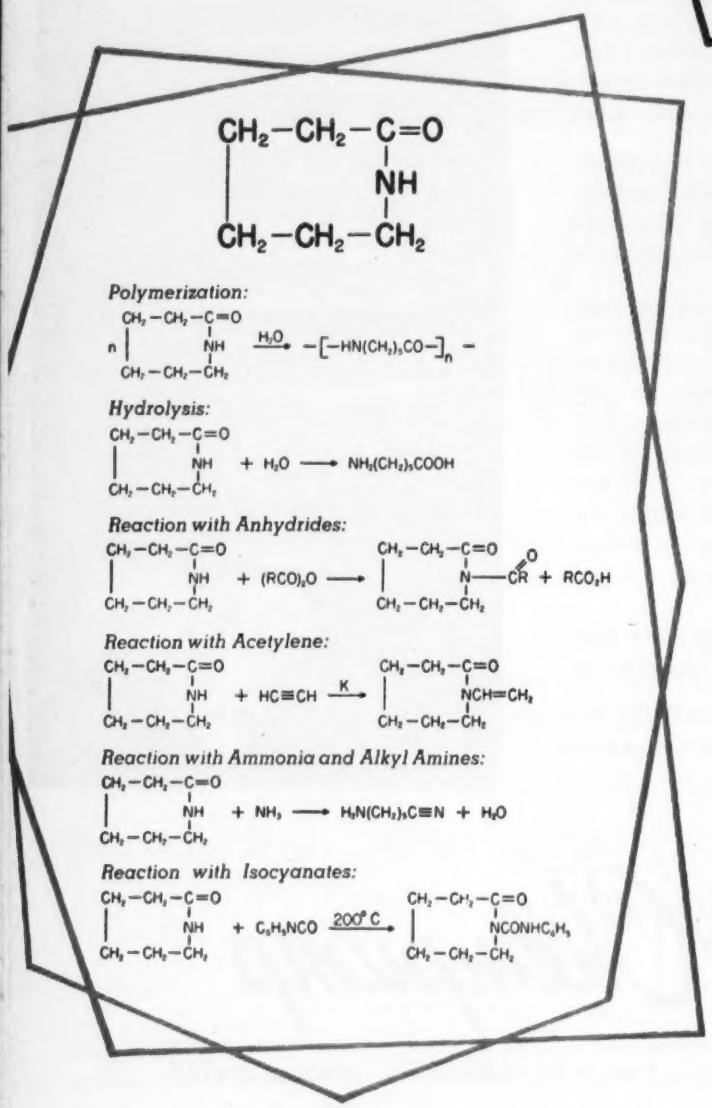
Development Chemist's Dream!

National
ε-CAPROLACTAM
building block for
completely new organics



ε-Caprolactam stands as a challenge to the creative ingenuity of American chemists and chemical engineers. From it can be built completely new commercial chemicals and resulting end-products with properties unknown today.

Consider its unique 7-membered ring, its polymer-forming potentialities . . . its reaction possibilities with other chemicals to create new materials useful to science and industry.

And then remember that this unique monomer is already priced low enough for volume use in resins and fibers.

Send for Technical Bulletin I-14R

Substantial product-development work is being done with National ε-Caprolactam. A considerable body of basic research data already exists. To encourage still wider interest, National Aniline has compiled a new 34-page brochure containing complete properties, known reactions, suggested uses and a comprehensive bibliography. Samples and additional technical help are available to those whose work may develop broader use of National ε-Caprolactam.

Allied Chemical

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Philadelphia Portland, Ore Providence San Francisco

In Canada: ALLIED CHEMICAL CANADA, LTD., 100 North Queen St., Toronto

Check 2488 opposite last page.

CORROSION CONTROL

Aluminum tube data is presented in comprehensive 48-page booklet which covers with text and illustrations details about variety of tube and pipe. Aluminum Tube Booklet—Revere Copper and Brass Incorporated, 230 Park Ave., New York 17, N. Y.

Check 2489 opposite last page.

Plastic pipe which is non-toxic, odorless, tasteless, and has high-impact strength and toughness, is described in Bul CE-80—American Hard Rubber Co., div. of Amerace Corp., Ace Rd., Butler, New Jersey.

Check 2490 opposite last page.

Plastic tape coatings, along with other materials needed for corrosion control of pipe, such as overwrap, surface filler, adhesive primer and application machines are described in Bul HCG 7369—Corr-Prev Division, Chase & Sons, Inc., 26 Spruce St., North Quincy, Massachusetts.

Check 2491 opposite last page.

Floor surfacing material made from self-curing plastic that gives protection against chemical corrosion, abrasion and impact is described in illustrated folder. Bul on Stonclad—Stonhard Company, Inc., Dept. 89, 401 N. Broad St., Philadelphia 8, Pa.

Check 2492 opposite last page.

Equipment-protection characteristics and advantages of nickel coating are discussed in 17-page, illustrated Industrial Nickel Plating Booklet—The International Nickel Company, Inc., 67 Wall St., New York 5, N.Y.

Check 2493 opposite last page.

High-temperature alloys for use in chemical, nuclear, missile and other applications are discussed in two bulletins. "Udimet 700 and 41" — Metals Div., Kelsey-Hayes Company, New Hartford, N.Y.

Check 2494 opposite last page.

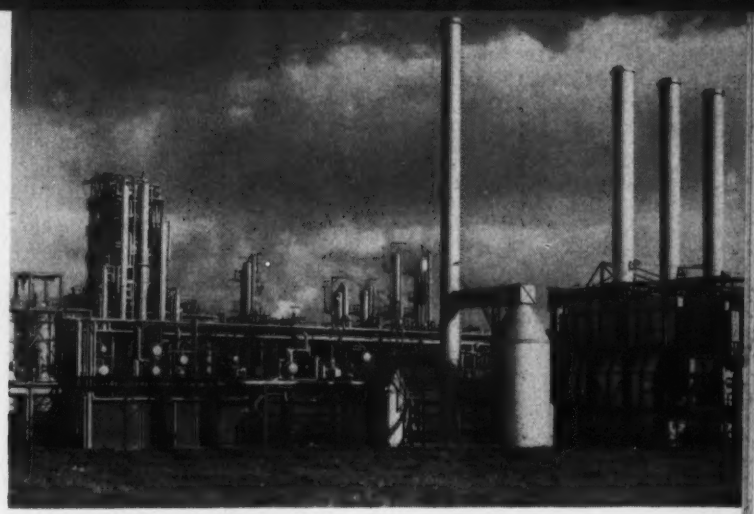
Titanium's behavior in 200 corrosion environments, plus design and fabrication characteristics of the metal, are described in 36-page Titanium Metals Handbook—Titanium Metals Corp. of America, 233 Broadway, N.Y. 7, N.Y.

Check 2495 opposite last page.

Glassed steel reactors of 50 to 2000-gal capacities are described in 12-page bulletin. Included are dimensional line drawings and material and construction specifications for various models in new series. Bul 971 — The Pfaudler Co., 1096 West Ave., Rochester 3, New York.

Check 2496 opposite last page.

Light-naphtha steam-pyrolysis method for ethylene attractive for U. S. companies



Rheinische Olefinewerke, GMBH, light naphtha cracking plant for production of ethylene, located at Wesseling near Cologne in West Germany. Cracking furnaces are at right

Although majority of plants pyrolysing naphtha built in past have been overseas in areas where natural gas or refinery gas was not available as a raw material, two plants are now on stream or being built in U. S. as economics increasingly favors light naphtha as petrochemical raw material

GORDON WEYERMULLER, Petrochemical Editor

Announcement was recently made of the world's largest ethylene plant, with a capacity of 380 million lb/yr, being built at Beaumont, Texas for Magnolia Petroleum Co., subsidiary of Mobil Oil Company, operating division of Socony Mobil Oil Co., Inc. This plant will be based on a steam-pyrolysis[1] method offered by the U. S. engineering firm that has built a number of these plants in Europe.

This is the second ethylene plant capable of providing for the use of steam pyrolysis of naphtha, which is being built or already on stream in the U. S. A steam pyrolysis plant was built by Monsanto Chemical Company in Texas City, Texas. It is completed and on stream with a rated capacity of 91 million lb/yr.

Reasons behind the increased activity in domestic light naphtha pyrolysis plants are basically twofold: diminishing availability of really cheap natural gas components, and the gasoline octane race. Refiners can no longer dispose of their light naphthas by blending into gasolines as the naphthas are so low in octane ratings. By calculated values, light naphthas are declining in value to the refiners. It is thus evident why it can be expected that there will be in the United States increasing use of light naphtha steam-pyrolysis for meeting the rising demand for ethylene and other olefins (butadiene, propylene, etc.).

Until fairly recently practically all ethylene made in the U. S. plants used ethane or propane from natural gas or refinery gas as raw material. In addition, considerable quantities of ethylene are recovered in refinery operations.

Steam pyrolysis has been widely used in Europe in areas where natural gas was not available, and refinery emphasis on fuel oil produces only insignificant amounts of refinery (cracking) gas. Thus liquid feed could be economically used. More than a dozen plants in England, Germany, France, and Italy produce olefins by pyrolysis of naphtha or light gas oil. Among these the U. S. engineering firm has built three for Imperial Chemical Industries and one for Shell in England — two for Montecatini in Italy — and one for Rheinische Olefinewerke in Germany.

The two U. S. plants use light naphtha liquid feed, refinery gas, or a combination of these. For example, the Magnolia plant will use both raw materials simultaneously. In this procedure, naphtha enters steam-pyrolysis unit and refinery off-gas is introduced beyond this unit.

Hence, a plant designed in this way can vary the gas-liquid ratio of raw materials as desired. Also, the liquid portion can vary widely in its proportions of various hydrocarbons.

Plant Size

Economics of pyrolysis method depends on size of plant and type of feed. The larger the plant, the higher the return on the investment. For example, a plant of about 350 million lb/yr, using a typical light naphtha, would provide a return of 23.3% after taxes on invested capital. Return on sales would be 11.0% per year. These figures are based on pilot plant results and cost estimates. Calculations are based on only ethylene recovered as a product for sale so are conservative.

A plant half this size would provide 14.6% return on invested capital and 9.0% return on sales. Corresponding figures for a plant ¼ this size would be 7.5% on invested capital and 6.1% on sales.

Feed

A wide variety of feed stocks can be used with good results. Using nine liquid petroleum feeds ranging from casinghead gasoline to heavy gas oils and from a variety of crudes, a recent pilot plant study[2] reported ethylene and butadiene yields, at constant conversion of feed, were relatively insensitive to feed properties. However, lower yields of propylene and butylenes were obtained from heavy (gas oils) than from light stocks (naphthas). On the other hand, operability factors dictate maximum conversion level. This will result in olefin yields somewhat lower with heavy feeds than with light.

Judging the value of py-

1) Steam is added to feed stock as diluent to improve olefin yield. Recent pilot plant experiments (*1*) increasing steam/feed ratio by factor of 10 raised ethylene production by about 20%.

2) Knaus, J. A., and Hanisian, J. "Olefin production from liquid petroleum stocks." Presented at New York, N. Y., A.P.I. Refinery Division Meeting, May 27, 1959.

How modern refineries maintain maximum temperatures in tracer lines... without interruption

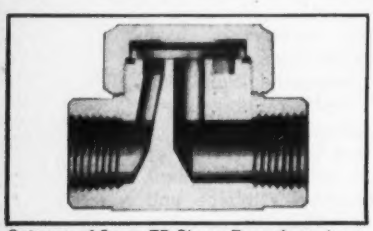
Production-Planned steam trapping insures continuous operation of process lines at design temperatures

By John W. Ritter, Test Engineer SARCO Company, Inc.

The maintaining of design temperatures in tracer lines may appear, at first glance, to be an extremely difficult problem. Temperature, of course, must be maintained at a uniform level; but unless air and air-steam mixtures are removed from the line, design temperatures are difficult to maintain. Further, because of extremely long lines, water hammer is inherent in tracer lines.

However, if a trap is selected which operates over a full range of pressures, ambient temperatures, and loads, it will drain the tracer line automatically. For many leading refineries the new Sarco TD-50 Thermo-Dynamic Steam Trap has proved a sound solution to this problem. Dozens of refineries from New Jersey to California, from Montana to Louisiana, originally started using Sarco TD's on a test basis. After experiencing the thoroughness of their day-to-day trapping operation, these refineries standardized on TD's.

The TD-50 has excellent resistance to water hammer, and it drains air and condensate as fast as they reach the trap. This trap helps to maintain constant temperatures, and operates perfectly on variations in pressures and temperatures.



Cutaway of Sarco TD Steam Trap shows hardened stainless steel disc, which is the only moving part in the unit.

Lightness of weight and compactness of design are advantages of the TD which make it particularly valuable for use in draining tracer line tubing. The TD is easily installed and, because of its unique thermo-dynamic principle of operation, it can be installed vertically (with a free discharge downwards) in self-draining, antifreeze applications.

Some 250 Sarco Thermo-Dynamic Steam Traps are installed on the tracer lines of this new catalytic hydrosulfurization unit at Socony Mobil Oil Company's Paulsboro, N. J., refinery.

SARCO TD-50 Steam Traps provide ideal solution to tracer line drainage at Paulsboro, N. J.

The 250 Sarco TD's used to drain steam tracer lines at Socony Mobil's Paulsboro refinery were selected for reliability. They can never "fail closed," never block heat transfer. TD's remove condensate and air as fast as they collect.

Since tracer lines are usually in exposed installations, the wide pressure range of TD's is important here. These TD's operate perfectly through a variety of weather conditions, temperature changes and load variations.

TD's have just 3 simple parts, all of stainless steel. They have high resistance to water hammer and to corrosion. They are easy to install and 90% of the TD's at Socony Mobil are mounted vertically for non-freeze operation. Maintenance is extremely low, often negative.

Write for literature today. Remember that Sarco can give you impartial advice on steam trapping because . . . 5928-B

SARCO COMPANY, INC.
635 Madison Ave., New York 22, N. Y.

Only Sarco makes all 5 types:
Thermostatic • Liquid Expansion • Float Thermostatic
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STEAM TRAPS • TEMPERATURE CONTROLLERS • STRAINERS • HEATING SPECIALTIES

Check 2497 opposite last page.

rolysis feeds based on a recent commercial design by the U. S. engineering firm, it was found that total byproduct credits increased as molecular weight of feed increased at constant yearly ethylene production. Casinghead gasoline is an extremely attractive feed, with butane and light naphtha following closely in that order.

Light naphtha has a low octane value which is expensively raised to meet gasoline standards. Isomerization must be employed. If octane values for gasoline continue to go higher, light naphtha will become increasingly attractive economically as a raw material for making ethylene or other petrochemicals. It is possible through steam-pyrolysis of light naphtha to obtain a 25-40% yield of high octane gasoline, in addition to regular yields of ethylene. This adds to the attractiveness of light naphtha as a steam-pyrolysis feed stock.

U. S. Bureau of Internal Revenue levies a tax of 2c per gallon on natural gasoline when sold even for non-highway use. A company like Magnolia, which produces its own natural gasoline, would have the advantage of not being required to pay this tax when the material is used to manufacture ethylene or other petrochemicals.

Location

The two ethylene plants in the U. S. using steam-pyrolysis are located on the Gulf Coast. It is possible that the major potential for pyrolysis method is yet to be realized in those sections of the country — such as the Mid-Continent, East Coast, or areas of the West Coast — where refinery gas or natural gas is either non-existent or in short supply. Increase in price of natural gas also makes steam-pyrolysis method more attractive.

(Further information on steam-pyrolysis method for ethylene and a limited distribution of the Knaus & Hanisian paper, can be obtained from the M. W. Kellogg Co., 711 Third Ave., New York 17, N. Y.)

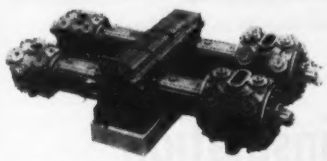
Check 2498 opposite last page.

Pressures from vacuum to 35,000 psi handled by compressor

Uses: Heavy-duty compressor applications in refining, petrochemical and chemical industries.

Features: Pressures from vacuum to 35,000 psi can be handled due to design flexibility which permits machine to be equipped with wide variety of cylinders in almost unlimited number of sizes.

Description: Balanced/opposed process compressor has 11″ stroke. Models are built with two, four, or six cylinders mounted in pairs, one on each side of crankcase, and connected to it on crankthrows 180° apart. Opposing forces cancel out, providing balance that permits compressor to be mounted any place which will support its physical weight.



Balanced/opposed process compressor, built with two, four, or six cylinders, ranges from 400 to 1750 bhp in size

Sizes range from 400 to 1750 bhp. Rated speed is 450 rpm with drive furnished by electric motor or other prime mover.

Overhung rotor construction simplifies installation and minimizes floor space requirements. Full force-feed lubrication is provided by direct-driven, gear-type oil pump.

(Model CJA compressor is product of Clark Bros. Co., division of Dresser Industries, Olean, N.Y.)

Check 2499 opposite last page.

Reodorization of plants and products in the petrochemical field is covered in brochure listing sources of objectionable odors in petroleum refining and citing methods for eliminating them. Reodorization Brochure—Rhodia, Inc., 60 E. 56th St., New York 22, N. Y.

Check 2500 opposite last page.

Stainless Steel keeps plastic clean

at Dow Chemical Company

This is one of 36 blenders that mixes colors and other plastic additives at Dow Chemical Company's Midland, Michigan, plant. For purity of color the liquid plastic must be kept free of dirt and other impurities, so Dow uses blenders made of Stainless Steel.

Stainless Steel resists corrosion. It has a smooth, hard surface that's easy to keep clean. There's no problem of color carry-over and no residue to foul new batches. Stainless Steel is strong, won't chip or crack, practically never wears out. Stainless Steel equipment actually costs *less* because it lasts so long.

If you need a material that assures product purity, specify Stainless Steel. Buy USS Stainless Steel through your local U. S. Steel representative or at your nearest Steel Service Center.

USS is a registered trademark

United States Steel Corporation—Pittsburgh
American Steel & Wire—Cleveland
National Tube—Pittsburgh
Columbia-Geneva Steel—San Francisco
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Supply—Steel Service Centers
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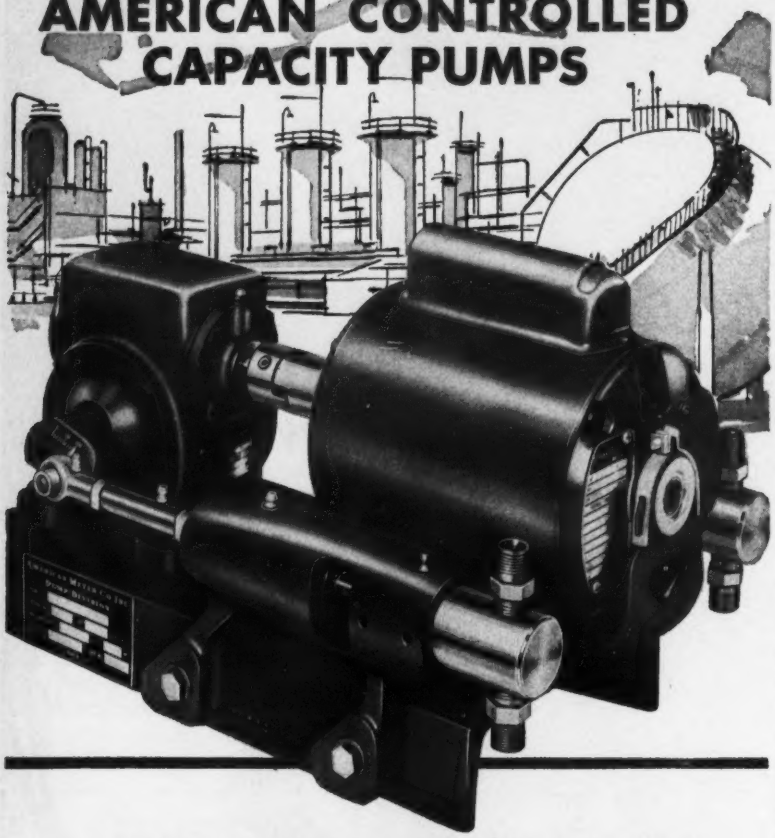
United States Steel

USS

100 SERIES

AMERICAN CONTROLLED CAPACITY PUMPS



JOB ENGINEERED FOR LONG-TERM ACCURACY AND LOWEST MAINTENANCE COSTS

New American controlled capacity pumps are precision built to meet the needs of Chemical Processing, Refining and Boiler Feed applications. Quality construction assures highest accuracy in feeding precisely metered fluids or slurries into low or high pressure systems in virtually all desired ratios, with flow, temperature, pressure, conductivity, PH and other controlled process variables. Control may be manual or automatic—with electric, hydraulic or pneumatic systems.

Newly designed models are available to handle a wide variety of "tough," corrosive and viscous materials.

Write today for full information on American's new controlled capacity pumps. They're sure to meet *your* fluid proportioning requirements.

AMERICAN® METER COMPANY
INCORPORATED ESTABLISHED 1836
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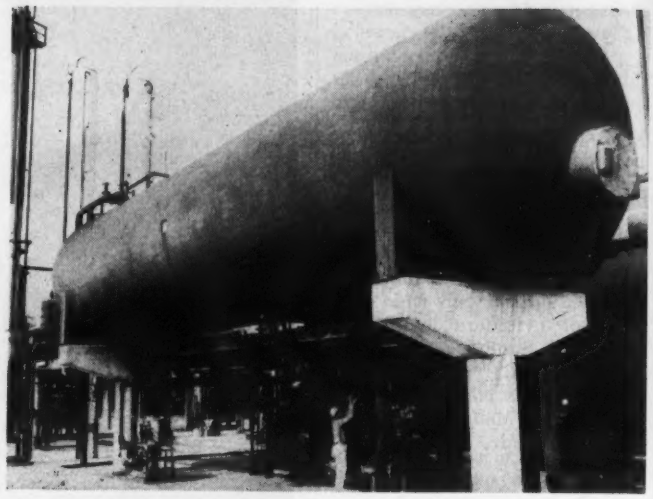


Vessel insulated with cellular glass in alkylation area

cellular glass insulation prevents frosting in cryogenic applications

Petrochemical plant uses 10 carloads of material on vessels and piping at temperature down to −300°F

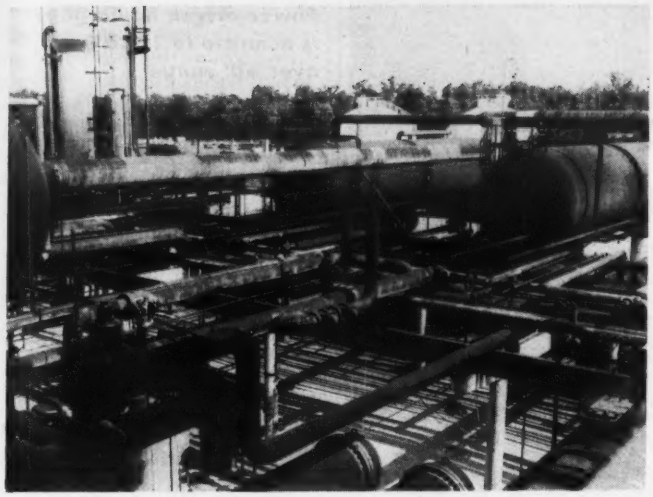
S. J. KNIFFEN, Plant Engineer
Texas Butadiene and Chemical Corporation
Channelview, Texas
with **CP STAFF**

A cellular glass insulation has been found to be highly satisfactory for use in alkylation process at Texas Butadiene where temperatures down to −300°F are encountered. The alkylation process produces a basic compound used in the manufacture of 145-octane gasoline.

Process lines and vessels are subject to frosting at the extremely low temperatures. This frosting can cause deterioration of these low-temperature lines and vessels as well as other adjacent equipment that it drips on. Frosting on insulation also lowers its insulating qualities. Cellular glass material has prevented frosting on all of the equipment to which it has been applied.

Blocks of the cellular insulation, called Foamglas, are obtained in required shape for line or tank. For unusual shapes, such as valves, product can be easily cut and shaped at the job site.

Light weight of insulation makes it easy to install. After insulation is in place, it is



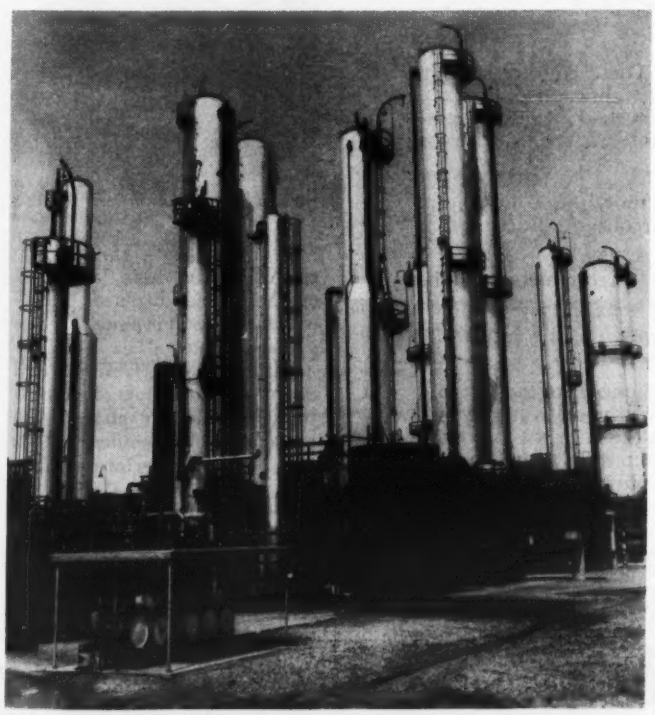
Cellular insulation is used extensively on piping as well as vessels

swabbed with an asphaltic mastic. Steel bands are then placed around the assembly. Monel bands are used for some applications.

About 10 carloads of the cellular insulation were used for the alkylation application at Texas Butadiene. It has given good service during the three years it has been in use. Only a minimum of maintenance has been required on it. It has been found to be an excellent vapor and moisture seal.

(Foamglas insulation is product of Pittsburgh Corning Corporation, One Gateway Center, Pittsburgh 22, Pa.)

Check 2502 opposite last page.



Cellular glass insulation is also used in butadiene recovery area

MORE WAYS TO PROFIT FROM PLASTISOLS

LINING
A BIG TANK

COATING AN IMPELLER
Applicator: Paterson Rubber Co., Paterson, N. J.

corrosion protection with Unichrome Plastisols

AVOIDS COSTLY MAINTENANCE

Impellers made of ordinary steel coated with plastisol withstand chemicals that even stainless steel impellers cannot. And it's practically "lifetime" protection for tanks lined with this baked-on vinyl coating. What better way to stretch service life of equipment; to cut out maintenance?

Spray or dip applied, Unichrome Plastisols provide a seamless, pore-free shield that safeguards against a whole host of corrosives. This resilient coating won't chip, resists abrasion. Costs less than applying vinyl sheet materials, too. Objects of any shape or size can be coated . . . so long as they can be maintained at baking temperature.

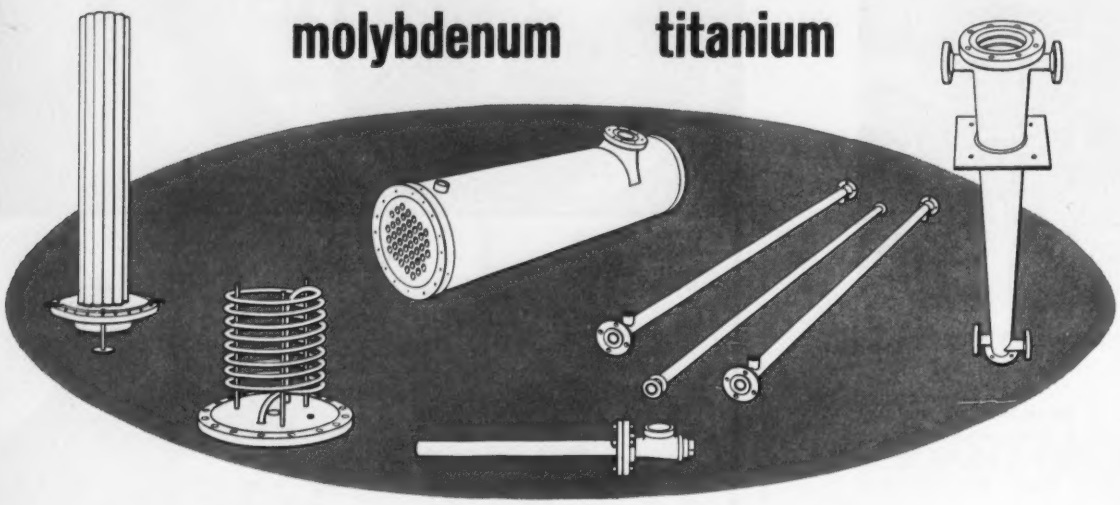
Expert applicators are strategically located to handle your equipment promptly. Or your own crews can do it. Send for Bulletin VP-3.

M&T **coatings and finishes**
METAL & THERMIT Corporation
General Offices: Rahway, New Jersey

Check 2503 opposite last page.

If One of these Six Materials is Best for Your Process

tantalum
columbium
molybdenum
tungsten
zirconium
titanium



That's the One you'll get in Fansteel Equipment

"There's no middle ground with tantalum . . . its use is either pointless or imperative." We said that back when we first introduced tantalum chemical equipment and it's still true. And we recommend tantalum *only* when it is the best and most economical material for the job . . . when any other metal would surely fail.

This most remarkable metal is used in chemical equipment because of its phenomenal resistance—its immunity—to acid corrosion. And although Fansteel is the world's largest producer of tantalum metal and tantalum equipment, we recommend and fabricate equipment of other materials when:

—tantalum's unique qualities would obviously be wasted under less than severe conditions,

—conditions other than those requiring tantalum's complete corrosion immunity might be the real problem. These conditions may be excessive heat, wear, abrasion or impact. And in such cases, Fansteel engineers will suggest the use of other materials with or without tantalum.

Fansteel's experience with tantalum, columbium, molybdenum, tungsten, zirconium and titanium benefits you three ways:

1. You are sure that the correct metal will be used on your particular application;
2. You have the convenience and the familiarity of a one-source supply, and
3. You get equipment designed, engineered and built by men who know the materials as well as the fabricating techniques . . . men with the basic experience that comes only from years of producing corrosion control equipment.

FANSTEEL

Talk to your Fansteel representative about your chemical process equipment problem, or address inquiries to the Equipment Department, Metals Fabrication Division. Samples of metals for testing are available upon request; arrangements can be made for the loan of certain equipment for pilot operations or heat transfer studies.

G595

FANSTEEL METALLURGICAL CORPORATION, NORTH CHICAGO, ILLINOIS, U. S. A.

Check 2504 opposite last page.

Power-driven liquid gage is accurate to 1/16" over 60' range

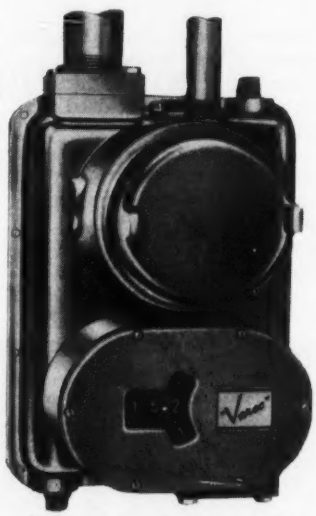
Friction removed as factor in accuracy determination

Uses: Measuring liquid levels in tanks.

Features: Accuracy to 1/16" over working range of 60'. Sensitivity is better than 1/64", and repeatability 1/32" or better.

Description: Indicating mechanism is driven by electric power, eliminating friction and accessory operation as factor in accuracy determination.

Device consists of force-measuring mechanism consisting of torque tube, arm and contacts; and displacer fabricated into solid plate of any suitable material.



Head of power-driven liquid level gage

Displacer is driven up and down (in and out of liquid) by reversible two-phase servo motor. It is suspended on the torque arm by perforated steel tape.

Functioning on the force-balance principle, system operates as follows: When load on torque tube is greater than net displacer load, motor drives displacer so that more liquid is displaced, thus reducing force. If the force on torque tube diminishes, the opposite occurs.

Variations in net weight of tape as liquid level decreases are compensated for by positioning storage sheave and sprocket sheave so that tape build-up on storage sheave shortens effective length of tape.

(Varec Dynamatic liquid level gage is development of The Vapor Recovery Systems Company, 2820 N. Alameda St., Compton, Calif.)

Check 2505 opposite last page.

Rate of nitrogen removal tops earlier catalysts

Uses: Pretreatment of catalytic-reforming feedstocks for contaminant removal, especially nitrogen and sulfur, and treatment of intermediate oils for improved color, storage stability and sulfur reduction.

Features: Activity in nitrogen removal is almost twice that of earlier catalysts. This provides improvements in catalytic reforming.

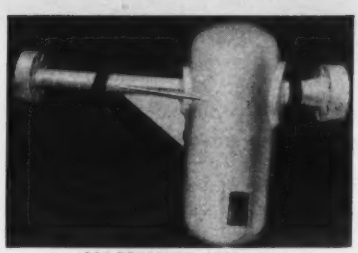
Description: Fully regenerable, nickel-containing catalyst has lower catalyst density, greater heat stability and longer life.

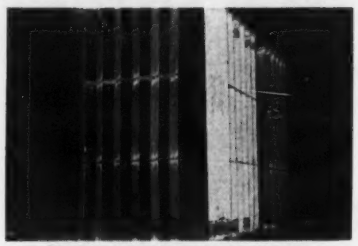
Increased activity in sulfur removal results in improved product quality, even in processing of poorer grades of feedstocks, according to manufacturer. It is available in commercial quantities.

(Type S-4 Hydrobon catalyst is development of Universal Oil Products Company, 30 Algonquin Rd., Des Plaines, Illinois.)

Check 2506 opposite last page.

"—and that, gentlemen, is my opinion for what it's worth."


GAS PRESSURE, 1500 p.s.i.


SPECIAL ALLOY STEEL DEFLECTORS

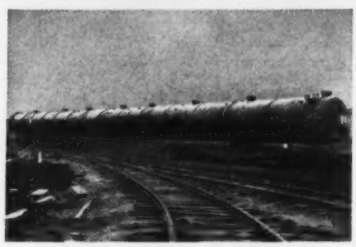
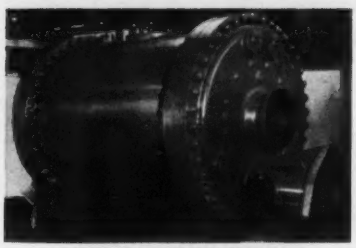
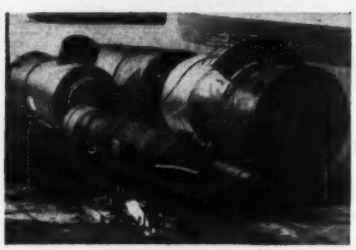

TOWER, 8'6" dia. x 154' in length

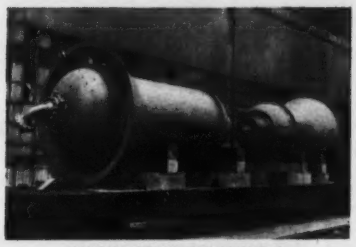
PLATE WORK, 55' dia. cone


SPECIAL CHEMICAL VESSEL

STAINLESS AUTOCLAVE


WATER SHIPMENT

GALVANIZING POT


SPECIAL STAINLESS VESSELS

SPECIAL CONDENSER

MACHINERY PARTS

MADE TO ORDER EQUIPMENT FOR OIL REFINING & CHEMICAL PLANTS

We place at your disposal one of the largest and most thoroughly equipped plants of its kind, featuring advanced production methods with experienced personnel in all departments.

PRODUCTS—Towers, Stills, Condensers—Kilns, Heat Exchangers, Pressure Vessels, Plate Work—All Codes, Any Material, Special Machinery, Machine Work.

SPECIAL SERVICES—X-Ray Equipment—Stress Relieving Furnaces.

SHOPS—Boiler, Welding, Machine, Fabricating, Pipe, Blacksmith, Anglesmith, Sheet Metal, Copper, Separate Stainless Shop.

WATER AND RAIL SHIPMENTS—Our plant, including crane for loading and handling is located on the Delaware River with piers and deepwater to accommodate sea-going ships and railroad connections to all points.

SUN SHIPBUILDING & DRY DOCK COMPANY

CHESTER, PA.

Check 2507 opposite last page.

WITH

TAYLOR-WHARTON

The flexibility of MOBILIZED GAS STORAGE can now be yours with low-cost Taylor-Wharton Gas Transports. With these mobile storage units, you can eliminate the expense of charging remote permanent storage systems and greatly reduce initial cost and maintenance.

The heart of the Transport is a group of Taylor-Wharton seamless steel pressure vessels. Their quality, established by closely controlled manufacturing processes and rigorous inspection, makes the Taylor-Wharton Transport a sound investment in durable, up-to-date equipment. All vessels are normalized for extra safety and manufactured to I. C. C. 3A2400 specifications. Available in capacities of 38,500 to 56,000 cubic feet, the vessel groups are rigidly mounted on modern single or tandem-axle trailers. A weatherproof rear housing protects the valve and manifold system.

Catalog No. 58 gives complete details on this practical system for flexible gas storage. Write for it today.

More than a Century in Harrisburg 24, Pa.

H HARRISBURG STEEL CO.

Division of HARSCO CORPORATION

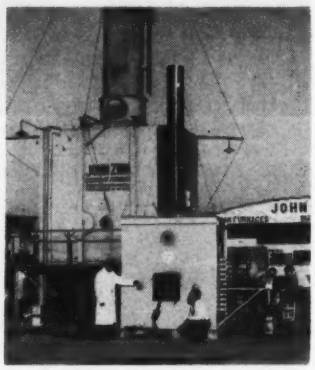
CYLINDERS TUBES FLANGES COUPLINGS

Check 2508 opposite last page.

Test furnaces available for research

Announcement is made of test furnace facilities that are available in Tulsa, Oklahoma for research work by companies in the chemical, petrochemical, and petroleum fields.

Main furnace is 12′ high, 10′ wide, and 12′ deep. Stack is 5′ in diameter and rises to 50′ above grade. Large opening directly above burner permits experimentation with very long flame pattern.



Test is being run on one of smaller furnaces in foreground. Large furnace is in background

(For further information on test furnace facilities contact John Zink Co., 4401 S. Peoria St., Tulsa 5, Okla.)

Check 2509 opposite last page.

Polyethylene, copolymer plant start-up in Japan

World's first commercial plant to use the Standard Oil Company (Indiana) process for making polyethylene and copolymer plastic recently was dedicated by Furukawa Chemical Industries Company of Tokyo. Furukawa is also the first foreign licensee.

When regular commercial operations are under way, the new plant, using low pressure, will have a capacity of 20 million lb/yr.

Basic process design for plant was prepared by Standard Oil. Completed in less than year, plant is capable of producing plastics ranging from typical rigid polyethylene to copolymers having density comparable to conventional high-pressure polyethylene.

(Polyethylene and copolymer plastic process is development of Standard Oil Company, 910 S. Michigan Blvd., Chicago 5, Illinois.)

NEXT MONTH

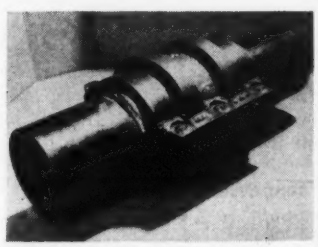
Feature story describes the methanol plant of Alba, S. A. in Brazil, which uses the Swiss Inventa process, with a catalyst insensitive to sulfur. Raw material is Bunker C fuel oil.

Joint handles 1000 psi prior to welding

Uses: Repairing pipe.

Features: Joint can be made which will withstand 1000 psi pressure prior to welding.

Description: Split-coupling is bored and turned from heavy wall, mild carbon-steel seamless tubing, and heavily reinforced with steel ribs and side-bars welded in place.



Split coupling permits welding repaired pipe while pumping

Neoprene gaskets, which are integral parts of coupling, are supplied for standard use, and silicone for extremely low or higher temperatures.

Couplings, available in 2, 2½, 3 and 4″ sizes, are supplied with internal clamping jaws to restrain pipe ends from pulling out when used as repair coupling. These are omitted when unit is used as repair sleeve.

(Split-couplings are development of The Pipe Line Development Co., 5700 Detroit Ave., Cleveland 2, Ohio.)

Check 2510 opposite last page.

THAT'S INTERESTING

S-t-r-e-t-c-h

Rubber bands up to 6 ft long and stretching to 18 ft are being used to hold lightweight cartons together in piles or on pallets. Bands are development of B. F. Goodrich Industrial Products Co.

Costly boring

The European corn borer cost American farmers nearly $98 million in 1958. The pest destroyed more than 100 million bu, about 2.9% of the crop.

How many's a crowd?

Recent survey shows that 60% of 102 companies responding put limitations on the number and rank of executives who may fly together. In many cases, no more than two or three key executives may be on the same plane at the same time.

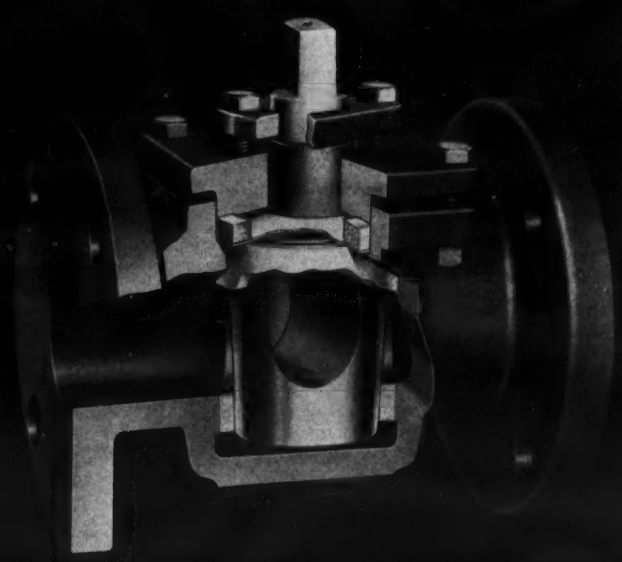
For more information on product at right, specify 2511 see information request blank opposite last page.

WHAT USERS SAY ABOUT THE NEW DURCO TYPE G SLEEVELINE

The new Durco Type G SLEEVELINE is a non-lubricated plug valve. A Teflon sleeve is pressed into a ductile iron or stainless steel body; a machined plug, Teflon diaphragm and gasket, a thrust collar, and a self-aligning adjuster make up the rest of this trouble-free, non-lubricated plug valve.

Available in ductile iron or stainless steel, screwed or flanged ends from ½" through 2", and in ductile iron flanged ends 3", 4", and 6". 150 psi rating.

Write for bulletin V/12.



sulfuric acid service

"Entirely satisfactory in service on 66°Bé sulfuric acid after 8 months."

latex user

"Valve on Latex service since May 1, has given no trouble. Other valves (gate, globe, ball, wedge, lift plug) failed because Latex build-up froze the valve."

chlorine gas service

"In service for ten months on chlorinator handling dry chlorine gas at 50 psi —ambient temperature. Formerly used lubricated valve which gave considerable trouble due to freezing."

caustic service

"Valves used on cell liquor, concentration 12%, at 160°F. After one month valve was removed and inspected. All movable parts were free, no wear was evident. Valve was reinstalled and has been in six months continuous service with completely satisfactory performance."

phosphorous user

"Used on yellow phosphorous at 160-200°F. Valves are doing fine. Thanks for a product that works—and a valve that I can turn with one hand without breaking my back."

solvent handling

"Valves performing very well on toughest solvent service after five months, where lubricated plug valves were regularly replaced due to sticking caused by leaching out of lubricant."

DURCO
CORROSION RESISTING ALLOYS & EQUIPMENT

THE DURIRON COMPANY, INC., Dayton, Ohio

Valves • Pump • Filters • Process Equipment

American 200 Series Chemical Feed Pumps

• METERING ACCURACY OF ±1%

• CAPACITY TO 1624 GPH.

New 200 Series Simplex model can pump up to 812 gph. Duplex model has double this capacity. Maximum pressure of 10,000 psi.

Easy, inexpensive operation is assured by these quality features:

- Self-contained lubrication system – no downtime for lubrication.
- E-Z Clean Cartridge Valves simplify maintenance.
- Interchangeable liquid ends for greatest adaptability in the field.
- Precision screw adjustment on crank for easy accurate stroke regulation.
- Sealed Self-aligning bearings on crank and crosshead withstand greater radial and axial thrust loads.
- Crossheads of hardened and ground steel ride on cast iron.
- Heavy duty reducers.
- NEMA frame motors.

Precision built 200 Series pumps handle a wide variety of "tough," corrosive materials. In Chemical Processing, Refining and Boiler Feed operations, the pumps assure highest accuracy in feeding precisely metered fluids in virtually all ratios, with flow, temperature, pressure, conductivity, PH and other controlled process variables.

Write today for more information.

AMERICAN METER COMPANY
INCORPORATED ESTABLISHED 1836
pump division
13500 PHILMONT AVE. PHILADELPHIA 16, PA.

Check 2512 opposite last page.

Petrochemicals

NEW LITERATURE

Industrial insulations for applications from sub-zero to 1900°F are described in Bul 6451—The Philip Carey Mfg. Company, 320 S. Wayne Ave., Lockland, Cincinnati 15, Ohio.

Check 2513 opposite last page.

Iron body gate valves receive full treatment in two-color, five-page Gate Valves Bul—Walworth Company, 750 Third Ave., New York 17, N. Y.

Check 2514 opposite last page.

Metallic O-rings for a wide variety of severe services are detailed in 30-page handbook #596191A—United Aircraft Products, Inc., PO Box 1035, Dayton, Ohio.

Check 2515 opposite last page.

Power recovery advantages obtained through the use of gas turbine compressors are discussed in 12-page Bul P-10—Elliott Company, division of Carrier Corporation, Jeannette, Pa.

Check 2516 opposite last page.

Refrigeration systems in modern gasoline plants is subject of illustrated Bul 172—Clark Bros. Co., One of the Dresser Industries, Olean, N.Y.

Check 2517 opposite last page.

Flexible cushion couplings, ranging from fractional to 190 hp per 100 rpm, are described in 12-page Bul A669C—Dodge Manufacturing Corporation, Mishawaka, Ind.

Check 2518 opposite last page.

Adjustable-speed drives for low-horsepower applications are described, with detailed performance and application data included, in 12-page Bul D-2507—Reliance Electric and Engineering Company, 24701 Euclid Ave., Cleveland 17, Ohio.

Check 2519 opposite last page.

Gas sampling systems of a variety of different types to meet individual application are discussed in eight-page Bul 59-B651 — The Hays Corporation, Michigan City, Indiana.

Check 2520 opposite last page.

Petroleum tests and oil-testing instruments are presented 240-page Fisher/Tag Manual, which may be obtained from Fisher Scientific Co., 303 Fisher Building, Pittsburgh 19, Pa. for $2.50 per copy.

Quick-change mounting plate facilitates multiple use of Viberlec vibrator.

Speed the flow of bulk materials!

Viberlec Vibrators increase production...lower operating costs!

Most efficient and economical movement of bulk materials is provided by Viberlec electric external vibrators—from the finest powders to large solid pieces—through bins, chutes and hoppers.

Compact, powerful Viberlec vibrators offer many advantages:

- Practically silent operation – little or no annoyance to employees.
- Vibrated material may be hot or cold, under pressure, vacuum or controlled humidity. It may be sterile, toxic or protected by an inert atmosphere.
- Operating parts, sealed in steel are *not* affected by dust, moisture, water, humidity, corrosive or contaminated air.
- Rugged construction for years of service.

10' cord and switch with thermal overload protection are included.

WRITE TODAY for full information!

VIBER COMPANY 726 S. Flower St. Burbank 47, California

VIBER CO

Pioneers and leaders in the manufacture of

VIBRATORS

Check 2521 opposite last page.

Carbon Carried as Slurry to Prevent Dust

Sugar refiner finds that attrition is no higher than with previous mechanical system

E. D. GILLETTE
Process Development Manager
Refined Syrups & Sugars, Inc.
Yonkers, N.Y.

PROBLEM: Heavy, messy dusting was the rule on the one day per week that granular carbon was revivified at the Yonkers, N. Y., plant of Refined Syrups & Sugars, Inc. Dust arose from the bucket elevators and belt conveyors handling the dry carbon . . . a handling system used previously for bone char, before company adopted granular carbon for part of the decolorizing load.

An extensive dust-collecting system could have solved the problem. But it would have been too costly, considering the fact that it would be needed only a fraction of the time.

Solution: Investigation turned up some data on studies done by Pittsburgh Coke & Chemical Co., indicating that granular carbon could be transferred hydraulically — as a slurry — with attrition losses no greater than those in a mechanical handling system. Refined Syrups & Sugars decided to swing over to this method.

Handling system now in use is shown in Fig 1. Revivified and cooled carbon discharges into slurry tank below floor level. Here it is mixed with 60-Brix syrup to form a rather dense, viscous slurry containing about one lb carbon per gal syrup.

Two rubber-lined 2″ Oliver diaphragm slurry pumps (Fig 3), which can be loaded by vacuum and which are installed in a split-flow, parallel arrangement, raise the slurry about 100′ vertically plus 50 to 70′ horizontally to the filters. The rather tortuous route of the slurry through the old building is traversed through abrasion-resistant 2″ reinforced rubber hose. Turns are long and sweeping for reduced friction.

The two pumps together move 25-30 gal of slurry per minute, at a velocity of about three fpm, with discharge pressure, at pump, of 70 psi. At 12 cycles/minute, each pump is operating at approximately 75% efficiency, a bit lower than would otherwise be attained if vacuum filling were not utilized.

Air pressure to pumps is around 76 psi. Units operate without mechanical linkage to diaphragm and do not use a stuffing box or seal.

Fig 2 shows how baffle-protected photoelectric probes automatically maintain liquid level in slurry tank. It also

Fig 3—Diaphragm pumps used in hydraulic handling system have no mechanical linkage to diaphragm, use no stuffing box or seal

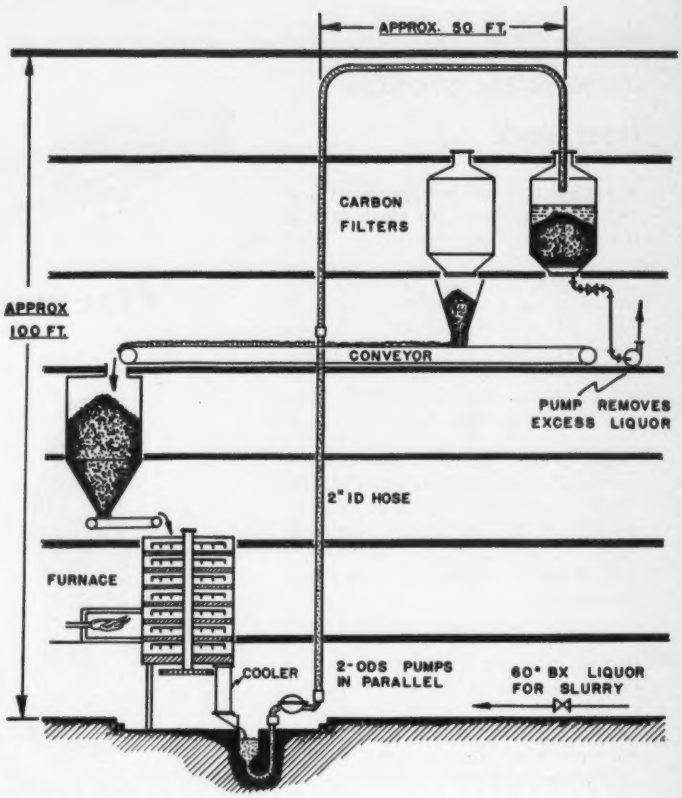


Fig 1—Hydraulic handling of granular carbon at Refined Syrups & Sugars. Two diaphragm pumps in parallel pump slurry of revivified carbon and 60-Brix liquor to filters

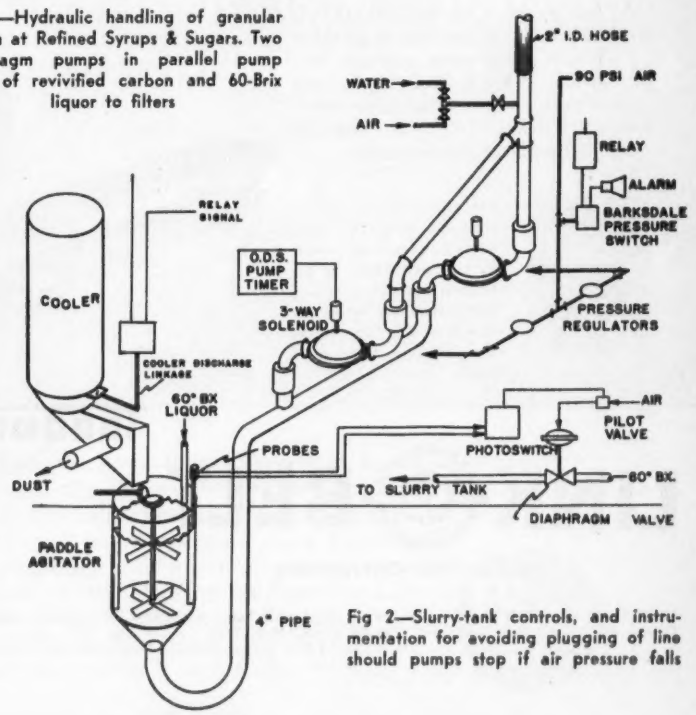


Fig 2—Slurry-tank controls, and instrumentation for avoiding plugging of line should pumps stop if air pressure falls

reveals how settling out of carbon in lines is prevented if pumps stop during periods of reduced air pressure, which could be caused by unusual demands on plant air.

A pressure switch in air-supply line is set slightly above minimum pressure needed to operate pumps. When line pressure drops below that point, power to solenoid controlling discharge of carbon from furnace into slurry tank is interrupted, stopping flow. At the same time a horn blows, signalling operator to admit water into hose line to keep slurry moving.

Results: Hydraulic transfer system, installed at relatively small expense, has eliminated carbon-dust situation. It gives much greater freedom of design in a new filter-house installation than has heretofore been available. Performance has been completely satisfactory since start-up early in 1958. Attrition is at a minimum.

(ODS slurry pump is product of Dorr-Oliver Incorporated, Stamford, Conn.)

Check 2523 opposite last page.

Need an oscillating conveyor now?

3 LINK-BELT types cover every need—all are immediately available from stock

Yes, Link-Belt makes a specific type of oscillating conveyor for every type of service.

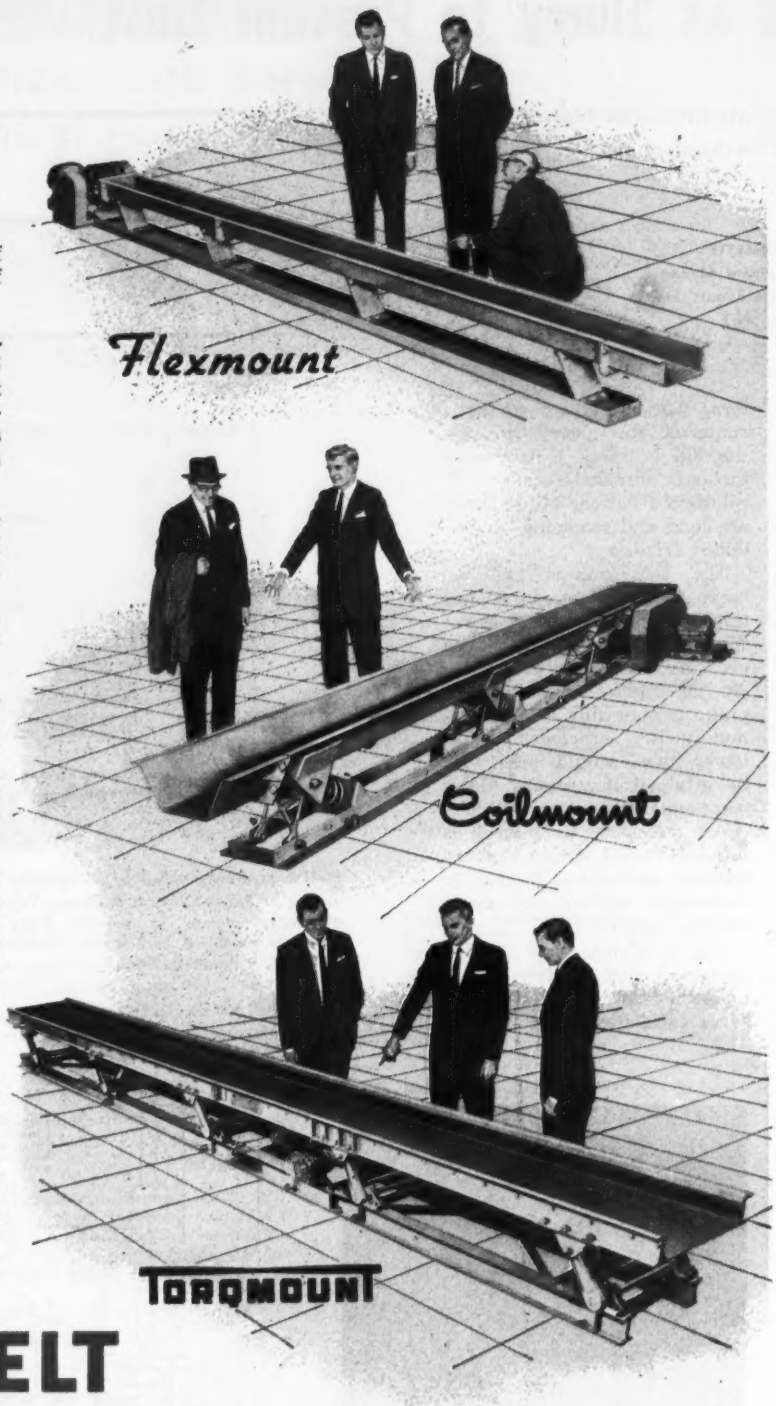
FLEXMOUNT for light-duty service. Ideal for gentle handling up to 25 TPH of 100-pounds-per-cubic-foot material. Widths of 8, 12 and 18 in.—all with 4-in. deep troughs. Flexmounts are pre-engineered — available from stock in 5- and 10-ft. sections.

COILMOUNT for medium-duty service. For applications up to 80 TPH of 100-pounds-per-cubic-foot material. Widths of 10 and 20 in. with 6-in. deep troughs. Available from stock in completely assembled 5- and 10-foot sections.

TORQMOUNT for heavy-duty service. For severe service requirements on installations with capacities up to 350 TPH of 100-pounds-per-cubic-foot material. Widths up to 48 in. with 8-in. deep troughs. Popular 36-in. size stocked.

In every case, Link-Belt POSITIVE ACTION controls the load at all times . . . assures continuous, uniform flow of materials regardless of surges. And each type functions as near to NATURAL FREQUENCY as possible, minimizing power requirements.

For the best in light-, medium- or heavy-duty conveying, call your nearby Link-Belt office or authorized stock-carrying distributor. Or write for new Book 2744 containing complete data on all three types.



LINK-BELT

OSCILLATING CONVEYORS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There are Link-Belt Plants, Sales Offices, Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World. 15,121

Check 2522 opposite last page.

"Sorta gives me a feeling of importance to realize I'm making up the minds of some mighty big companies!"

THAT'S INTERESTING

Mood brightener

For those who are depressed and are in need of a brighter outlook on life, Chas. Pfizer & Co., Inc. has just the thing. It's a new drug —Niamid—on which a patent was recently issued. It's also been used on people suffering from angina pectoris. Both pain and frequency of attacks have been reduced.

Automatic flit gun

Flying insects haven't much of a chance with a new automatic dispenser which releases into the air at regularly timed intervals measured amounts of concentrated insecticide spray. The device operates around the clock, releasing the spray every 15 minutes.

Tail lights

Substances that cause the tail-lights of fireflies to flicker—luciferase and luciferin —are used to measure adenosin triphosphate, the source of energy for reactions in the human body.

And that's not all. For more than three years, Rheem Centrifugal Spray has been delivering lined drums free of pinholes or blisters, thin spots and skips or globs. Air turbulence is eliminated. Linings are cured by unique Rheem Vertical Curing in three stage, high temperature ovens. For more information, or help in developing a lining for a problem product, write the world's largest manufacturer of steel shipping containers at 1701 West Edgar Road, Linden, New Jersey. Plants across the country . . . Chicago, Houston, Linden, New Orleans, Richmond, Calif.; South Gate, Calif.; Tacoma. For other sales offices see the Yellow Pages.

Rheem

Check 2524 opposite last page.

model H-25 PAYLOADER® "faster cycles plus large load-carrying capacity"*

*Says Clyde T. Puryear, Plant Supt. of Hi-Acres, Inc., Fertilizer Division, Groveland, Florida, "the H-25 'PAYLOADER' is working out very satisfactory with faster cycles plus large load-carrying capacity. The power-shift transmission supplies accurate, smooth power to dig full bucket loads. It is well-balanced to handle the bucket load on fast delivery. There is no lost motion."

Hi-Acres is a typical fertilizer mixing plant—typical in the large amount of bulk material handling that is needed and typical in that "PAYLOADER" tractor-shovels are "standard" for handling the bulk of such work.

The model H-25 unloads box cars, carries fertilizer ingredients from the various bins to the hopper of the bagging operation, does general clean-up and plant maintenance.

This "PAYLOADER" is the most concentrated package of tractor-shovel ever designed in its size range. Its combination of 2,500 lb. carry capacity, only 6 ft. turning radius, power-shift transmission, power-steering and power-transfer differential move big tonnages efficiently even in close quarters. For full H-25 data call your Hough Distributor or return the coupon.

THE FRANK G. HOUGH CO.
744 Sunnyside Ave., Libertyville, Ill.

Send full H-25 "PAYLOADER" data

Name
Title
Company
Street
City State

12-A-1

HOUGH®

THE FRANK G. HOUGH CO.
LIBERTYVILLE, ILLINOIS
SUBSIDIARY — INTERNATIONAL HARVESTER COMPANY

Check 2525 opposite last page.

One adjustment flattens several sizes of bags

Uses: Flattens bags as they come from filling machines, to assure firm, safe stacking or palletizing, and storage in less space.

Features: Several different bag sizes can be flattened by unit without changing machine adjustment.

Description: Flattener is basically a belt conveyor with

Degree of flattening can be varied by changing weight on upper belt

an inverted power feeder driven from snub-pulley shaft. Upper belt can be adjusted to desired minimum position above lower belt. Exact amount of compression required is achieved by simply adding weight to shelf on upper belt.

Unit comes in belt widths from 8 to 24".

(Type 32 bag flattener is a development of New London Engineering Company, New London, Wis.)

Check 2526 opposite last page.

Capacity of belt feeder is 5 to 550 tph

Accurate unit mounts easily in low-headroom space

Uses: Feeding chemicals, fertilizers, ores, other bulk solids.

Features: Capacity range of five to 550 tph. Either of two drive arrangements available is reported to assure consistent accuracy and fine control of output. Low headroom permits easy mounting beneath bins. Closely spaced idlers and rubber flashing minimize spillage.

Description: Belt feeder is ready for installation as shipped. One drive arrangement is constant speed,

JELLIFF Wire Mesh

YOU can profit by our 78 years of experience in weaving wire.
YOUR specs, your delivery date, on mesh from 1¼" to 200 x 200 — plus a complete line of precise filter weaves.

For information, phone CLearwater 9-1615 or write Dept. 27

WIRE PRODUCTS Jelliff SINCE - 1860
THE C. O. JELLIFF MANUFACTURING CORPORATION
SOUTHPORT • CONNECTICUT

Check 2527 opposite last page.

modernize with
HydroLectric

A GREAT NAME IN LIFT TRUCKS

- Two driving wheels instead of one
- Braking with handle in any position
- Automatic parking brake (optional)
- Sealed alloy gears instead of chains
- Sealed ball-bearing rollers in masts
- 100% more steering ease with two wheel drive
- Power unit removal complete in 20 minutes
- Greater tire capacity equivalent load ratings

LIFT TRUCKS INC. W.W.W. STUEBING CINCINNATI

• *Write for Bulletin KHL*

A TRUCK FOR EVERY PURPOSE AND MATERIAL

LIFT TRUCKS, INC.
CINCINNATI 14, OHIO

Check 2528 opposite last page.

through gearmotor and roller chain. Capacity here is controlled by quadrant control gate with fine screw adjustment.

Optional drive is variable-speed reducer and roller chain, working with quick-adjusting quadrant gate having control settings in 1" increments. Thus capacity can be adjusted by varying gate opening, altering belt speed, or both. Manual controls may be mounted on reducer, or remote controls may be used.

(F-8 belt feeder is product of Barber-Greene Company, 400 N. Highland Ave., Aurora, Ill.)

Check 2529 opposite last page.

Aerosol leakers spotted in 'bubble bath'

Leaking aerosol paint cans leave telltale bubbles as they pass through a hot-water bath at Illinois Bronze Powder Company, Chicago, Ill. They are steadied on non-magnetic

Cans may be easily plucked from line for inspection even though they are held securely while being conveyed

stainless steel belts by non-electric magnets (called Magna-Rails) underneath . . . despite speeds of 80 per minute.

Method eliminates use of guide-rails which have to be adjusted for various size cans.

(Magna-Rails are product of Eriez Manufacturing Company, Erie, Pa.)

Check 2530 opposite last page.

DOES YOUR MIXING EQUIPMENT MEET THESE STANDARDS ?

- Ease in maintenance through simplicity of design
- Durability because of stellite faced stator and rotor
- Precision control affording correct clearances down to the smallest particle size
- Maximum shearing surfaces of rotor and stator achieve highest dispersion rate in minimum time

COLLOID MILL

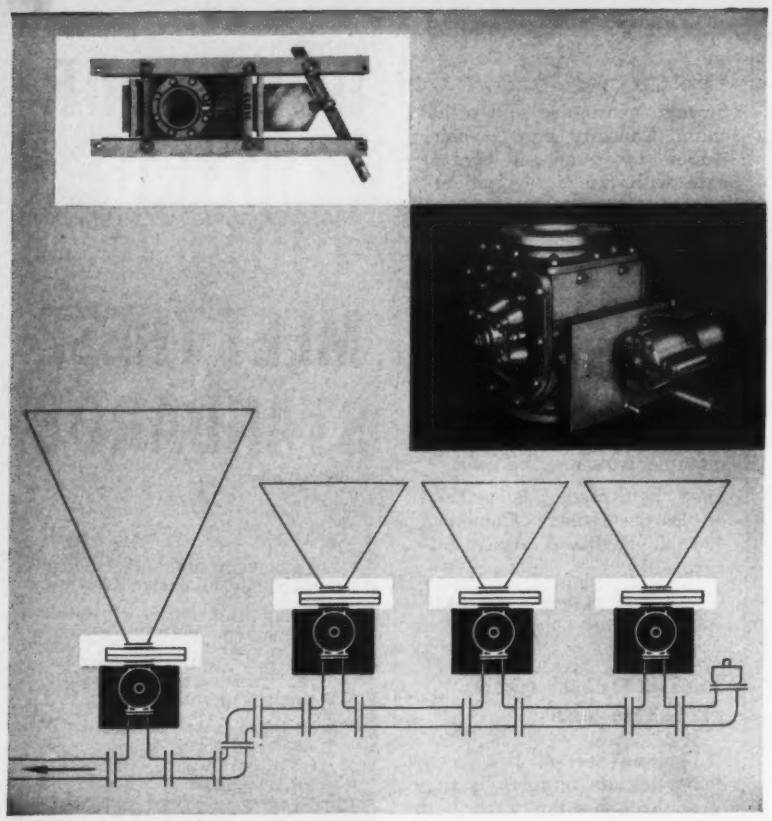
PREMIER

. . . and only PREMIER OFFERS ALL THESE FEATURES . . . RESULTING IN . . . INCREASED PRODUCTION . . . LOWER COSTS!

Contact Premier for complete engineering service on any mixing problem

PREMIER MILL CORP.
224 P Fifth Ave., New York 1, N.Y.

Check 2531 opposite last page.



BLEND AND TRANSPORT PNEUMATICALLY

Here's another practical solution to a chemical materials blending and handling problem. Here, several dry, granular solids are proportioned and blended in transit—a cost cutting combination of operations made possible by A-S-H Rotary Feeders and Universal Slide Valves.

This was our solution to the problem of a prominent manufacturer. If you face a similar problem you'll find it worthwhile to talk it over with your local A-S-H Sales Engineer. At your request we'll send his name and address and the Data Sheets describing these components in detail.

***THE ROTARY FEEDER LEASE-PURCHASE PLAN**—For pilot unit or plant-test operations, where the scope of the test may not justify the full purchase of a Rotary Feeder, we offer a Lease-Purchase Plan. Ask our Representative for details.*

the **Allen-Sherman-Hoff** company

257 E. Lancaster Ave., Wynnewood, Pa.

Offices and representatives in principal cities

MATERIALS HANDLING EQUIPMENT

Check 2532 opposite last page.

Aluminum construction of tank protects purity and color of liquid adhesives and resins, one of which is here being filled through 22" opening (standard for drums). This large opening provides full accessibility for cleanout. Two-inch vent plug in top permits full flow-out from bottom drain without removing large closure, and also serves as opening for gaging contents by stick.

Shipping liquids in 300-gal tanks streamlines handling

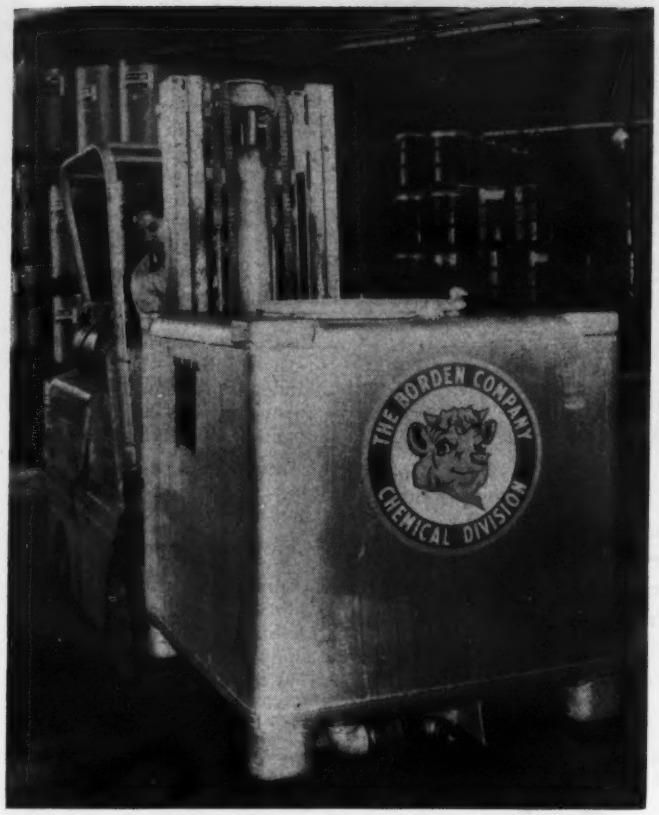
Returnable aluminum containers carry resins and adhesives from shipping dock to point of use, where contents are drawn off as needed

Supplying liquid adhesives and resins in returnable 300-gal bulk aluminum tanks has helped The Borden Company's Chemical Division capture a sizable share of West and Northwest markets, largely in the wood industry. The company has 133 of these tanks in use as adjuncts to trucks and drums, and is now discussing further expansion.

As with any new idea, some customer resistance was experienced when the method was first announced about three years ago. But creative selling—of product *plus method*—has overcome this. At present, the tanks are limited only to companies using one a month, a relatively high quantity since the specialized products normally are used in small batches.

Big advantage is, of course, the simplified handling from shipping dock right to point of use, where the material can

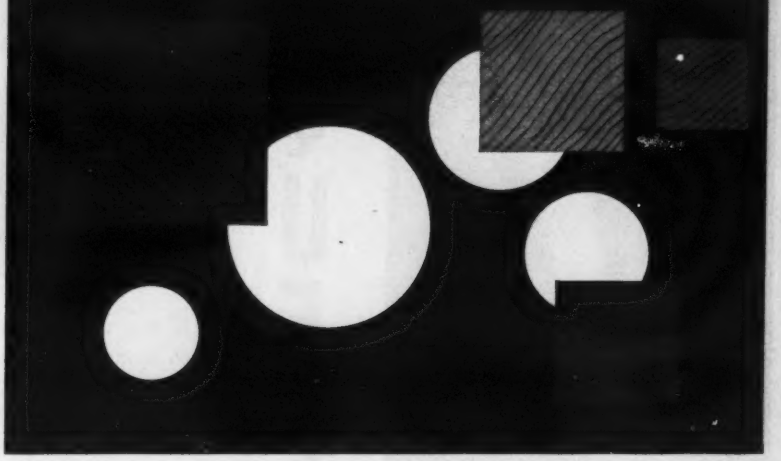
To page 126



Fork-truck handling is safer and more efficient than moving the equivalent five 55-gal drums to point of use, often done previously by rolling individual drums. Some plants not having other uses for fork trucks have built their own carts for moving the tanks, in some cases out of spare or junk parts. Borden salesmen have helped design such carts in a number of instances. Note angle welded to tank bottom to protect outlet fittings and valve while tank is being moved.

Resin or adhesive is easily tapped from 1½" outlet at point of use. Draining in this way assures almost complete emptying, keeps losses minimum. Fittings are brass, but are being converted to aluminum, same as tank.

How many of Your Scales are SQUARE Pegs in ROUND Holes?

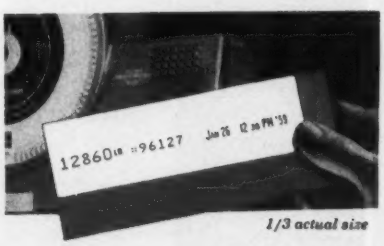


Accuracy alone is not enough ...Scales must *fit the job*

Scales that were right for their jobs in your plant yesterday may be "misfits" today. This can easily happen as a result of *changes* in plant layout, materials handling, inventory controls, or in value or quantity of materials weighed.

And misfit scales can bottleneck production, infect your weight records with costly errors, slow down materials handling, undermine inventory controls—product quality—customer goodwill!

Be sure your scales are not just 100% accurate, but 100% *adequate*, too. We will gladly arrange for an adequacy test to cover any or all of your scales. A few minutes at each weighing station will give you the facts on scale capacity and location, dial visibility, platform size and height and other factors that determine *scale adequacy*. Address: TOLEDO SCALE, Division of Toledo Scale Corporation, Toledo 12, Ohio.



1/3 actual size

NEW TOLEDO PRINTWEIGH "400"

Prints **complete** weight records on tickets or sheets, also on strips. Full-figure printing, even when unit weights are used. Positive weight identification, with selective numbering, weight symbols, or consecutive numbering. Time and date printing available. Transmits weight data for recording by remotely located office machines, if desired. Ask for Bulletin 2017.

SERVICE Factory-Trained 240 Cities

TOLEDO®

Headquarters for Weighing Systems

Check 2533 opposite last page.

VISQUEEN
TRADEMARK
'L'
FILM

If you make giant balloons light and strong enough to soar into the upper atmospheres . . . or ship corrosives, acids and adhesives . . . or transport hydroscopics in drums or cartons—look to VISQUEEN 'L' film to do the job better, less expensively. VISQUEEN 'L' film is stronger . . . tougher . . . as pinhole free as a polyethylene film can be. Write for samples.

VISQUEEN *film— first and foremost polyethylene film.*
A product of the long experience and outstanding research of
PLASTICS DIVISION
VISKING COMPANY
Dept. CP-12, 6733 W. 65 St., Chicago 38, Ill.
Division of UNION CARBIDE *Corporation*
In Canada: VISKING COMPANY DIVISION OF UNION CARBIDE CANADA LIMITED, Lindsay, Ontario.
VISQUEEN, VISKING and UNION CARBIDE are registered trademarks of Union Carbide Corporation.

Check 2534 opposite last page.

be drawn off from the tank as needed. Storage space conservation is another advantage. (Borden says they use 30-35% less storage space for the same amount of product as contained in the equivalent number of 55-gal drums.) There is no price differential between product in tanks and in drums.

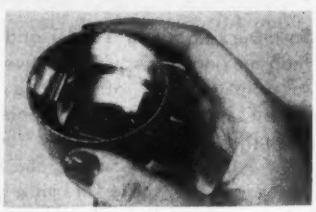
The full tanks are shipped from Borden warehouses in Springfield, Oregon; Kent, Washington; and Los Angeles, Calif., by contract carrier. A return bill of lading is included, and empties are returned by the carrier, collect, to point of original shipment.

(Tote Tanks described here are made by Tote System, Inc., Beatrice, Neb.)

Check 2535 opposite last page.

(Further information on liquid adhesives and resins may be obtained from Chemical Division, The Borden Company, 350 Madison Ave., New York 17, New York.)

Check 2536 opposite last page.



Spring clip in cap

. . . grips aerosol cans firmly, yet permits overcap to be removed easily. Applicable to any aerosol can without modification of container, cap assures more effective stacking and packing.

(Spring-grip cap was developed by J. L. Clark Manufacturing Co., 2300 Sixth St., Rockford, Ill.)

Check 2537 opposite last page.

Package sorting and merging system, photo-electric type, is covered in bulletin. Literature also describes application of measuring controls on conveyor lines. Photomation, Inc., 96 S. Washington Ave., Bergenfield, N.J.

Check 2538 opposite last page.

THAT'S INTERESTING

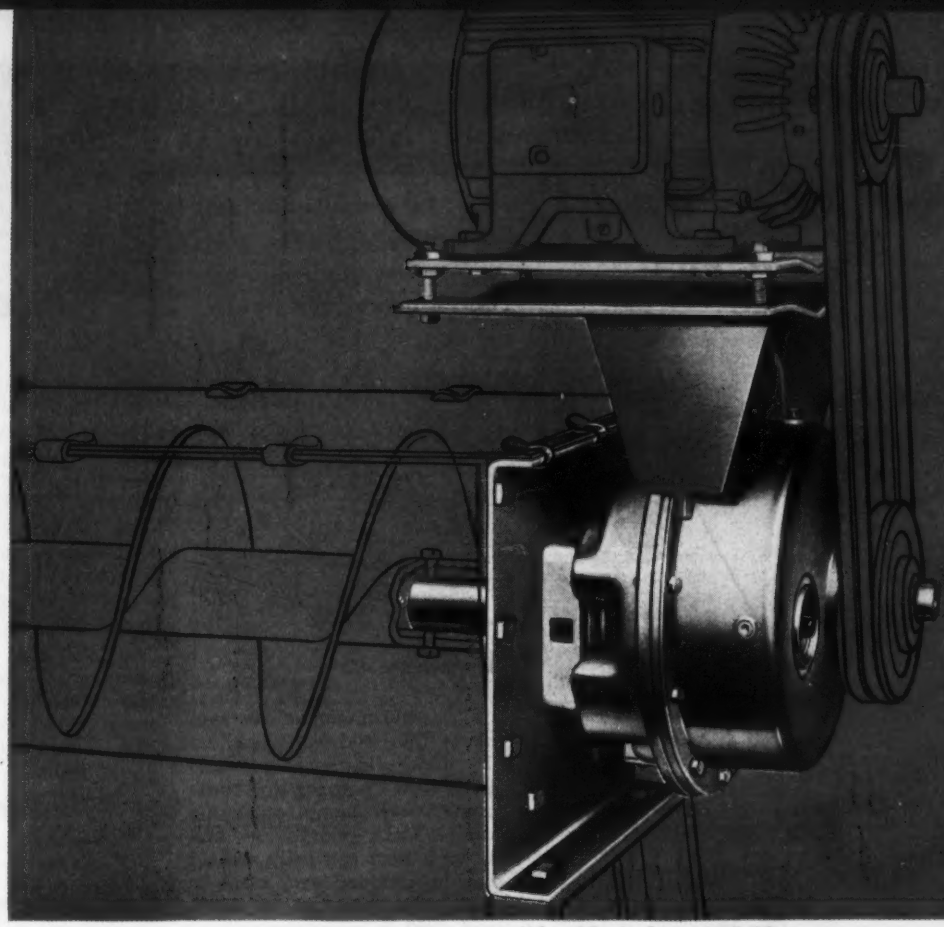
Jet age handling

Containers made of a rigid urethane formulation sandwiched between fiberglass are being used on United Air Lines' DC-8 jets for rapid unloading of luggage. They are tube-shaped and are designed to match contour of cargo compartments. Weighing only 84 lb, containers can handle loads well over 1100 lb.

What price smog?

Refiners on West Coast can blame the smog for a $50 million outlay they must make for new catalytic reforming and hydrogenation facilities. Stiffer smog rules will require olefin content of motor fuels to be cut from the present 23% to 12.5% by 1961. To accomplish this, gasoline blends must be changed.

For more information on product at right, specify 2539 see information request blank opposite last page.



NEW! FALK Screw Conveyor Drive

U.S. and Foreign Patents Applied For

—the drive our customers asked for

Our customers helped us design this new unit. We sent our men into the field to find out what our customers needed in a screw conveyor drive—then our engineers designed a new drive that offers the maximum of service, versatility, operating economy and long life. Here are some of its outstanding features:

A COMPLETE DRIVE: Saves engineering and assembly time. Six sizes to cover entire range—each with these ratios: — 4:1, 9:1, 14:1 and 24:1. Bolts to any standard trough end—eliminates trough end bearing. Eliminates drive shaft wobble. Efficient FALK single helical gears.

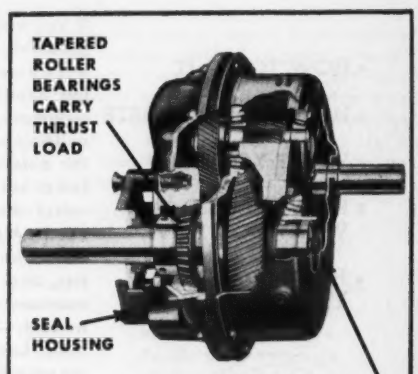
SEAL HOUSINGS: Choice of seals (neoprene or leather lip, felt or waste) to accommodate material conveyed. Space between trough seal and unit seal prevents conveyed material from reaching unit seal.

REMOVABLE DRIVE SHAFT: Snap ring assembly permits easy removal. Five sizes, from 1½" to 3⅞".

TROUGH END: Can be fastened to any standard trough. Eight sizes, from 6" to 20".

ALL-STEEL MOTOR MOUNT: Saves costly engineering and installation time and costs; no motor plates to design or fabricate. Motor can be mounted in virtually any position. Pre-drilled to accommodate NEMA standard motors ½ to 30 HP.

AN IMPORTANT ECONOMY: Buy only what you need—the basic reducer alone, or with trough end and/or motor mount. For detailed information, contact your Falk Representative or Distributor—or ***write direct for Bulletin 7106.***



FALK is a registered trademark

THE FALK CORPORATION, MILWAUKEE 1, WISCONSIN

MANUFACTURERS OF QUALITY GEAR DRIVES AND FLEXIBLE SHAFT COUPLINGS

Representatives and Distributors in most principal cities

FALK

...a good name in industry

AUTOMATIC BATCHING HANDBOOK

EVERYTHING YOU NEED TO KNOW ABOUT AUTOMATIC BATCHING

- HOW TO DO IT
- HOW MUCH IT COSTS
- WHAT YOU NEED
- HOW TO USE WHAT YOU HAVE
- HOW TO SELECT THE RIGHT SYSTEM

If you are now combining two or more ingredients in any kind of formula or batch, write now for this new *free* automatic batching handbook. It describes in detail how automatic batching works, how to convert existing plant facilities or plan new plants for automatic operation. It illustrates the latest batching systems available, lets you select the right type for your particular needs. Also shows you how to combine materials handling equipment, storage facilities, and weighing equipment for greatest economy, increased production. This is the newest, most complete handbook on automatic batching available—be sure to write for your free copy today!

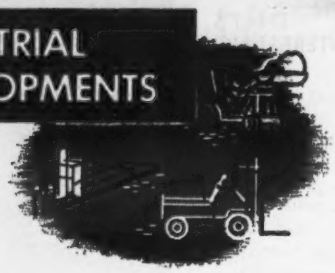
HOWE

THE HOWE SCALE CO. • RUTLAND, VT.

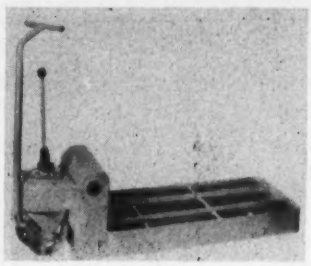
A SUBSIDIARY OF SAFETY INDUSTRIES, INC.

Check 2540 opposite last page.

LATEST INDUSTRIAL TRUCK DEVELOPMENTS



. . . in design, capacity, operating features, and accessories for improved performance and safety

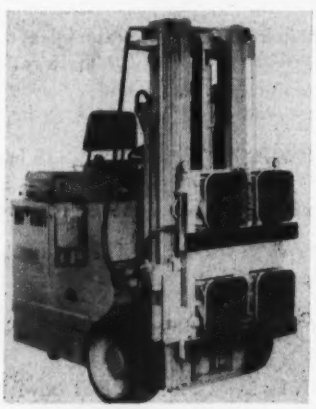


Lighter by 40%

. . . is what manufacturer says about this skid lift truck. Its 5″ under-clearance prevents loads from "hanging up" while going over bump or on a ramp. Deck moves up and down almost vertically so load can be dropped very close to wall. Truck comes in 2500- and 4000-lb capacities.

(Lightweight skid lift truck is product of The Special Products Division, The Colson Corporation, Somerville, Mass.)

Check 2541 opposite last page.



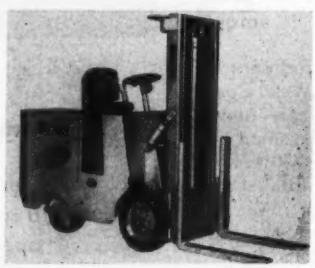
Used instead of clamps

. . . for handling filled large cartons, each suction cup of attachment holds 300 lb with safety. Each 12 x 12″ cup contains sensing device which actuates a solenoid to apply vacuum from reservoir to cup as soon as contact is made.

Cups are mounted on carriage equipped with manufacturer's standard sideshifter to provide travel 4″ to either side of center, speeding pickup of load. Hydraulic adjustment positions each set of cups vertically. Green light tells operator when vacuum is strong enough to lift load.

(Vacuum cup lift-truck attachment is development of Yale Materials Handling Division, The Yale & Towne Mfg. Co., 11,000 Roosevelt Blvd., Philadelphia 15, Pa.)

Check 2542 opposite last page.



Precise inching

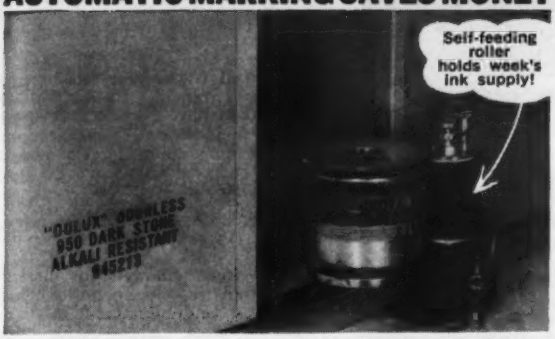
. . . combined with fast acceleration and infinitely variable travel speeds is reported for line of electric fork trucks with carbon-pile speed-control system. Maintenance is less because control does away with speed contactors, complicated master switches, and resistance boxes.

Trucks have capacities of 4000, 5000, and 6000 lb. Right-angle stacking aisle is 93″ plus length of load; minimum intersecting aisle is 6′. Top travel speed is 8 mph. Lifting speed of fully loaded truck exceeds 40 fpm.

(F-50T fork trucks are made by The Elwell-Parker Electric Company, 4205 St. Clair Ave., Cleveland 15, Ohio.)

Check 2543 opposite last page.

AUTOMATIC MARKING SAVES MONEY



New ROLACODER conveyor and case-sealer attachment marks boxes, cartons, drums, filled bags automatically

Saves on container printing costs... eliminates hand-stamping... insures faster identification

- Low-cost . . . pays for itself in months
- Compact . . . works by friction . . . requires no troublesome adjustments
- Install it yourself on any conveyor, case-sealer, etc. to mark from side or top
- Not a gadget — beautifully designed and precision-made to give consistently dependable performance, uniform impressions
- Patented type base holds type and dies securely, makes copy changing easy
- Spots imprints accurately in any desired location
- Many thousands in use by all industries

Models to suit every need . . . including twin-action units for marking 2 or 4 sides of cases simultaneously.

Write today for Bulletin "ROL-3"

First and foremost in automatic production-line CODING, MARKING and IMPRINTING machines — Gottscho®

GOTTSCHO Dept. W
HILLSIDE 5, N.J.

In Canada: Richardson Agencies, Ltd. • Toronto & Montreal

Check 2544 opposite last page.

Speed Handling of Heavy Sticky Materials with Jacketed Piping, Valves, Fittings

The best method for making heavy, viscous materials flow more freely is to apply heat—and the best way to apply heat is through Parks-Cramer jacketed piping, valves and fittings. It is axiomatic that the greater the heating surface, the faster the heating; and, the less viscous the product becomes, the easier it is to handle. These conditions are met by full jackets completely surrounding all product wetted surfaces—thus utilizing maximum heat transfer area.

The largest selection of jacketed piping and accessories is available in materials ranging from semi-steel (in stock) to carbon and alloy steel, bronze, aluminum, Ductile Iron, Ni-Resist, and plastic lined in sizes from 1¼" to 8".

Send for Catalog 356 for details.

Parks-Cramer Co.
PROCESS HEATING DEPARTMENT
FITCHBURG 12 MASSACHUSETTS

Check 2545 opposite last page.

NEW LITERATURE

Material Handling and Packaging

Belt conveyors, pre-engineered and shop-assembled from matched components, are dealt with extensively in 40-page handbook. Includes detailed engineering and selection data for the standardized sectional belt units, and illustrations and typical layouts of various installations in a number of industries. Components and accessories are listed. Book 2779—Dept. PR, Link-Belt Company, Prudential Plaza, Chicago 1, Ill.

Check 2546 opposite last page.

Industrial weighing—Four folders offer a convenient means of collecting information on industrial weighing systems. They cover the basic art of weighing, accuracy, manufacturer's weighing-system features, instrumentation used with weighing. Fact Folders—The A. H. Emery Company, New Canaan, Conn.

Check 2547 opposite last page.

Warehouse layout—Eight-page brochure looks at advantages and disadvantages of narrow and wide aisles. Illustrations show how many users are solving the narrow/wide-aisle problem with manufacturer's industrial trucks. "Warehouse Layout: Narrow Aisles or Wide?"—Automatic Transportation Company, Division of The Yale & Towne Manufacturing Company, 149 West 87th St., Chicago, Ill.

Check 2548 opposite last page.

Crawler tractor with 150 net engine hp is fully pictured and specified in 14-page Cat MS-1318—Construction Machinery Division, Allis-Chalmers Manufacturing Company, Milwaukee, Wis.

Check 2549 opposite last page.

LP-gas advantages as fork-truck fuel are discussed in six-page brochure—Industrial Truck Division, Clark Equipment Company, Battle Creek, Mich.

Check 2550 opposite last page.

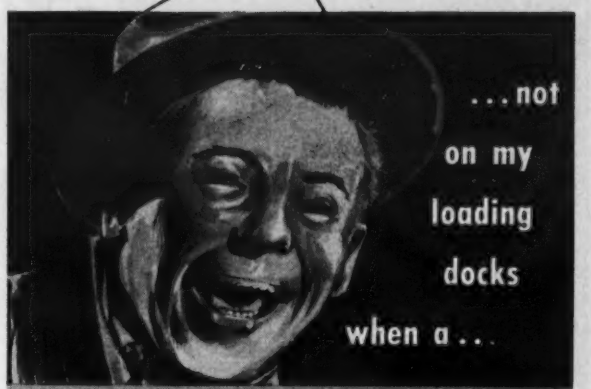
Fork trucks, electric-powered, which feature highly accurate inching and fast acceleration, are highlighted in "Acro-Smooth" Truck Literature—The Elwell-Parker Electric Company, 4205 St. Clair Ave., Cleveland 3, Ohio.

Check 2551 opposite last page.

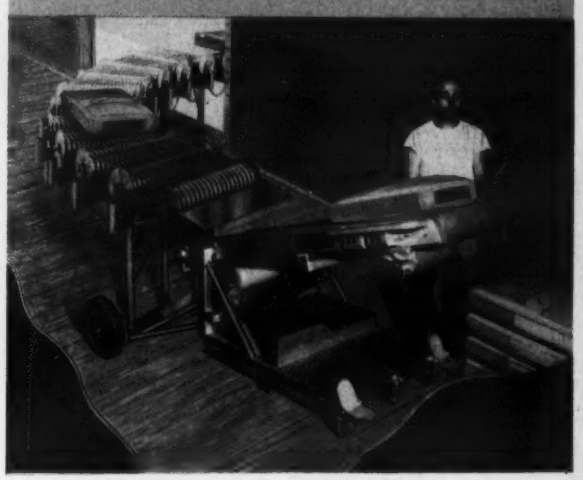
Jib cranes with capacities from 3 to 15 tons are illustrated and described in Bul 405-A—R. G. LeTourneau, Inc., 2399 S. MacArthur, Longview, Texas.

Check 2552 opposite last page.

CAR LOAD BAGS BY HAND?



POWER-CURVE automatic installation will show me a healthy saving in just one season!



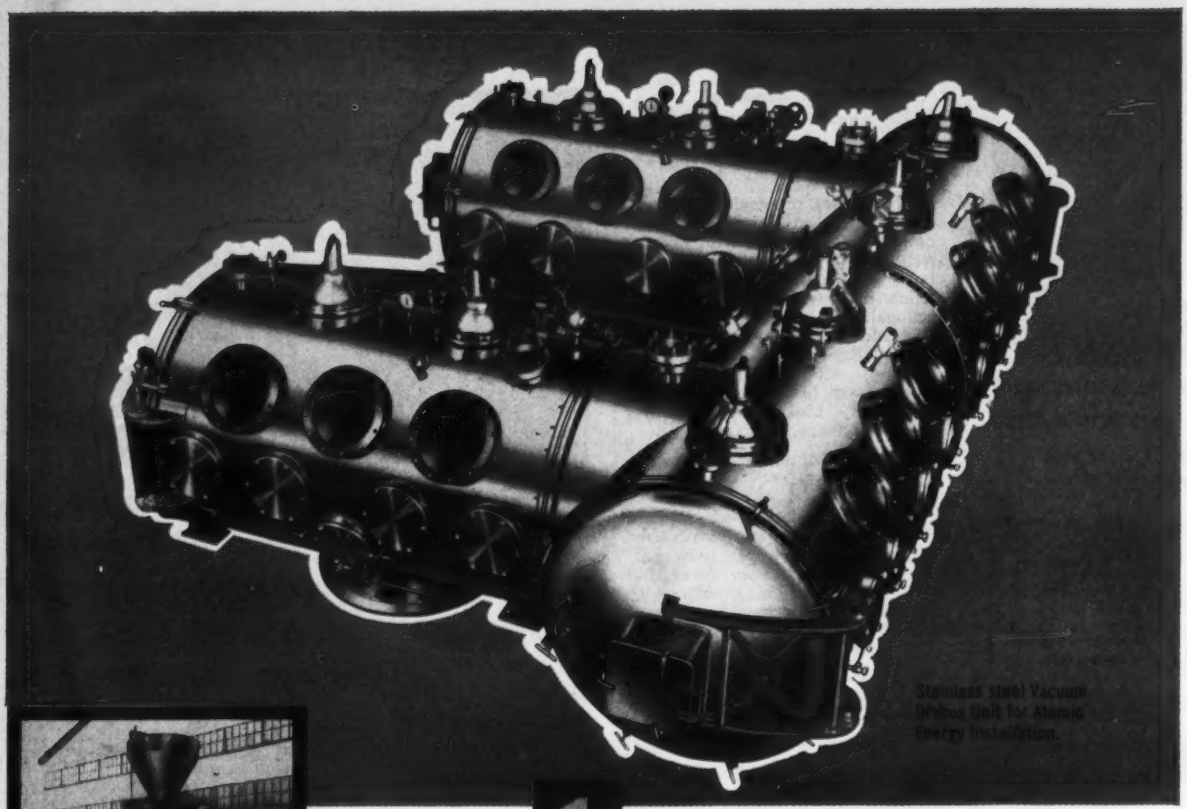
POWER-CURVE makes a quick payout on chemicals, loading without physical lifting, without interruption and *with just one man* . . . replaces a steady parade of hand trucks and labor. POWER-CURVE will flatten filled bags, route them to storage or to the dock, fill box cars or trucks from end-to-end and to full height neatly stacked against transit damage. POWER-CURVE can transfer, elevate, sort and select. It can unload, convey mixed loads, palletize and economize! It is used by dozens of chemical companies in one or more plants. It is self-powered, mobile, fully flexible and variable in height . . . Write for information tailored to your requirements, no obligation.

12 TYPICAL POWER-CURVE USERS

Aluminum Company of America
Barrett Division Allied Chemical and Dye Corp.
Celanese Corporation of America
Columbia-Southern Chemical Corp.
Diamond Alkali Company
E. I. Dupont de Nemours & Company, Inc.
Eastman Kodak Company
Koppers Company, Inc.
Monsanto Chemical Co.
Pacific Coast Borax Co.
Morton Salt Company
Union Carbide Corp.

POWER-CURVE
CONVEYOR COMPANY
2185 SOUTH JASON ST., DENVER 23, COLORADO

Check 2553 opposite last page.



Size #10 Sulphur Burner A.S.M.E. Jacketed Melter, External Valve Mechanism, Gas & Air Manifolds.

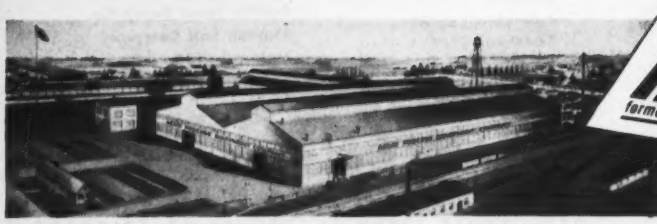
Stainless steel Equipment and Converter Unit for Formaldehyde Plant.

220" Pressure Stock Inlet for Paper Making Machine.

1 Dependable SOURCE FOR ALL PROCESS EQUIPMENT

For better coordination of an expansion or replacement program, Acme offers a complete organization for design, engineering and fabrication. Capable of complete responsibility, Acme also welcomes the opportunity of collaborating with engineering consultants or company engineering staffs. Our modern fabrication facilities are available for construction of a single unit or an entire plant.

Write for Catalog P-60: 48 PAGES INCLUDING VALUABLE HEAT EXCHANGE DATA.



ACME Process Equipment Co.
ORELAND, PA.
formerly ACME COPPERSMITHING & MACHINE CO.

HANDLING & PACKAGING

Industrial trucks and attachments for uses ranging from 1000 to 40,000 lb have performance data, dimensions, and specifications shown in eight-page Condensed Guide—Hyster Company, PO Box 847, Danville, Ill.

Check 2554 opposite last page.

Multi-circuit chargers for electric industrial truck batteries are pictured and described in two-page Form 6276—Exide Industrial Division, The Electric Storage Battery Company, Rising Sun and Adams Aves., Philadelphia 20, Pa.

Check 2555 opposite last page.

Fork-lift trucks' engineering, design, construction and operating features are highlighted in 16-page bulletin well stocked with photographs and cutaways. Bul BU-451A—Engine-Material Handling Division, Allis-Chalmers Manufacturing Company, Milwaukee 1, Wisconsin.

Check 2556 opposite last page.

Steel-strapping tools and how they are used fill four-page folder. Full data are provided on manufacturer's line of air-powered tensioners and sealers. Folder SPD-216—Signode Steel Strapping Company, 2600 N. Western Ave., Chicago 47, Illinois.

Check 2557 opposite last page.

Trucks and tractors for in-plant handling are covered in 16-page catalog which presents manufacturer's complete line. Equipment selector chart gives quick visual reference to each type of equipment. Cat 80-204—Dept. R9-26, Lewis-Shepard Products, Inc., 125 Walnut St., Watertown 72, Mass.

Check 2558 opposite last page.

Can sorters and uncasers are featured in eight-page brochure. Explains magnetic principle employed in the automatic units. "Automatic Can Sorters and Uncasers"—Atkron, Inc., Cuyahoga Falls, Ohio.

Check 2559 opposite last page.

Weights & measures—National Bureau of Standards has issued a 27-page publication which gives ground rules that must be followed in prepackaging goods sold in commerce. It is fundamentally a guide to weights and measures officials, but is also valuable for the processor in checking his own compliance, and also in determining accuracy of his weighing operations. "Checking Prepackaged Commodities" is available at 35c per copy from U. S. Government Printing Office, Washington 25, D. C.

Using carefully processed synthetic fibers in an efficiently constructed filter media, constant density cartridges . . .

• Assure precise filtrations
• Boost filter life 600%

Uses: Filtering various materials in chemical and allied industries. Units are designed for applications where accurate particle size control is required in 5 to 75 micron range.

Features: Tests indicate that cartridges are capable of giving from 250 to 600% longer service life than conventional units. Controlled micron ratings of cartridges assure uniform filtrations and eliminate costly under- and over-cleaning.

Operating on "depthwise" rather than "surface" filtration, cartridges have 25% greater filtering surface. Efficient design and construction also permits filtration equipment to be operated at lower pressure drops.

Description: Filter cartridges are of the replaceable type and consist of an aluminum core having viscose fiber filter media. The fiber discs are locked in place around the perforated core by end retaining rings and encased in stockinette for ease of handling. Edges of discs are scalloped to give maximum filtering action.

Controlled micron ratings are obtained by using different fiber deniers. Selected diameter fibers give consistent cartridge density throughout the micron range. A 50-micron rated cartridge will hold back particles 50 microns and over and will let pass all particles up to 49 microns.

Cartridges are being produced to fit standard 9¾ x 2½" and 10 x 2¾" filter cannisters. Elements can be made to fit any size units.

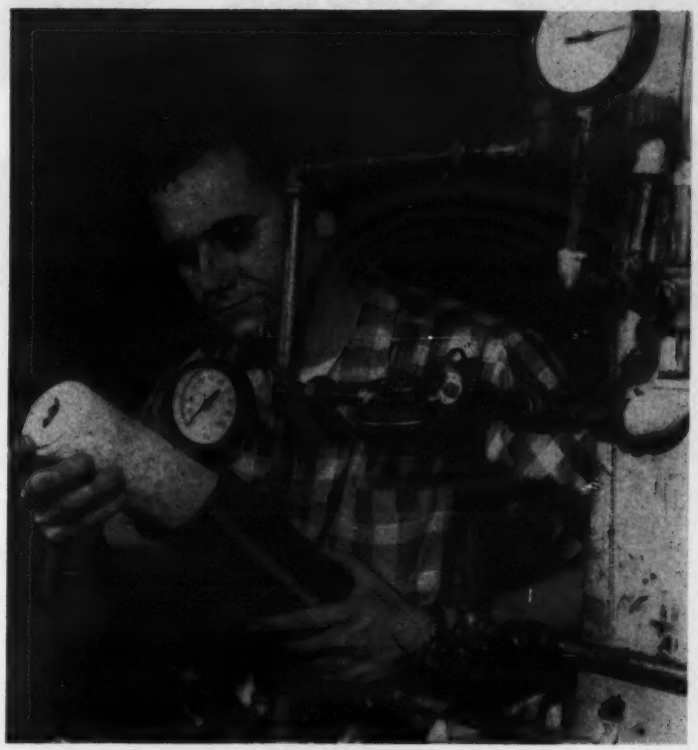
Viscose fibers are currently being used since they offer maximum practical resistance to solvent action. Where severe corrosive problems exist, cartridges can be fabricated from any synthetic fiber tailored to meet the specific chemical and physical conditions.

The cartridge design makes full use of edgewise filtration principle. Filtering action takes place through entire media bed. This assures maximum filtration in minimum space. It permits longer filter life, more complete filtration, and optimum filtration control. Design allows sediment to build up in the bed of the cartridge fibers instead of only on surfaces. Minimizing cartridge surface clogging also eliminates danger of batch contamination caused by cartridge collapse from excessive pressure buildups.

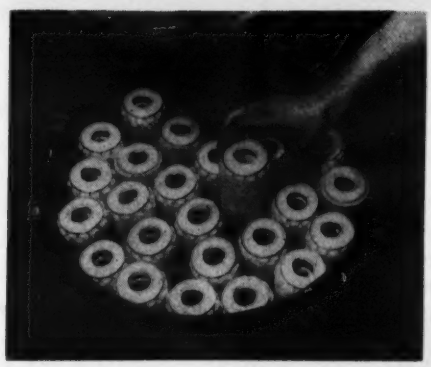
Born by Request

The new filter cartridge is reported to be the outcome of a specific request from industry to help solve a specific problem. A paint manufacturer needed a filter element that would eliminate all particles larger than 75 microns. He had not been able to find a fiber filter media that would yield results to meet his requirements.

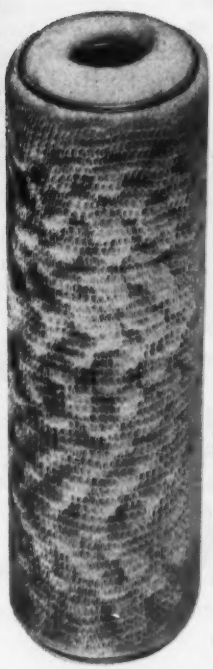
Samples of Feutron synthetic fiber felt looked encouraging. The material is composed of chemically crimped first quality rayon staple manufactured by the American Viscose Corporation.



▲ Cartridge being inserted in single canister. Operating on edgewise filtering principle, unit yields precise filtering results



▲ Field tested in tough production runs, cartridges proved that they had longer life, high solids capacity. One paint firm reported that it could filter 5200 gal before switching cartridges. Previous units could only handle 800 gal



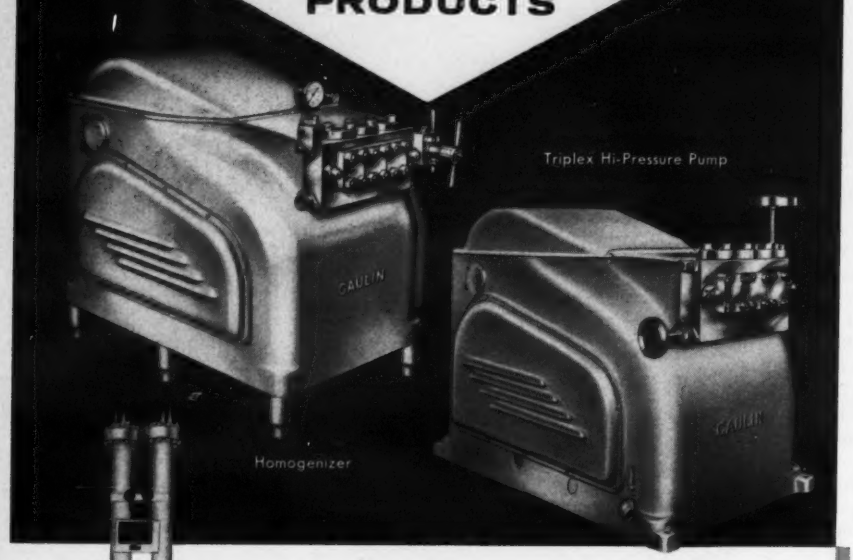
Cartridge consists of a perforated aluminum core with viscose fiber filter media ▶

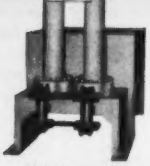
When the company requested that the felt be cut to specific size and shape, then be fabricated as a unit package, it became apparent that a new design in filter cartridge was born. Working with paint manufacturer's technical staff, engineers designed and successfully produced a filter car-

GAULIN G. T. A.

(GAULIN TECHNICAL ASSISTANCE)

Is the key to Savings IN MIXING OR MOVING PRODUCTS





HX-Hydraulic Pressure Exchange Pump

RE Colloid Mill

If you disperse, emulsify, blend particles . . . or pump, control, move liquids, Gaulin Technical Assistance *plus* Gaulin Equipment will bring you new product improvement and cost-saving solutions to your operations.

Gaulin Technical Assistance starts with the GTA library of product information. Ask for all or specific bulletins on each piece of equipment. Then, call for specialized GTA to bring you experienced advice and factual data on the best way to mix or move your product.

Fifty years' experience in analyzing fluid systems plus complete laboratory sampling and test facilities make *Gaulin Technical Assistance* the "extra" man in your product or process development program.

Gaulin TRADE MARK MANTON Gaulin

55 Garden Street, Everett 49, Mass.

World's largest manufacturer of stainless steel reciprocating, rotary, pressure exchange pumps, dispersers, homogenizers and colloid mills. MG 9-20

Ask GTA...

Gaulin Technical Assistance — for data on the complete Gaulin line: Homogenizers, Colloid Mills, Submicron Disperser, Triplex High Pressure Pumps and HX Pumps. Get GTA from your nearest Manton-Gaulin Representative . . .

Akron 8, Ohio
White Industrial Sales and Equipment Company
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998 Farmington Avenue

Check 2560 opposite last page.

tridge that met all the requirements. Over 18 months of field tests proved that the unit had definite applications in other chemical industries too.

(AFCO Feutron filter cartridges are product of American Felt Company, 312 Glenville Road, Glenville, Conn.)

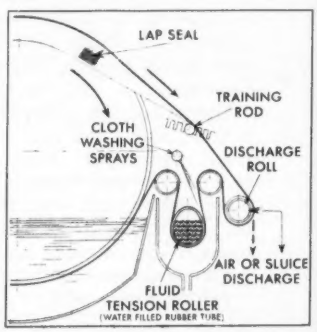
Check 2561 opposite last page.

Stops cloth blinding, ups filter efficiency, extends fabric life

Device automatically washes, replaces cloth on filter drum

Uses: Continuously removing, washing, and replacing cloth on drum filters.

Features: Device stops internal cloth blinding. Cakes too thin for other filters can be completely discharged without blowback, permitting fast



Cloth discharger washes filter fabric on rotary drum filters continuously. Mechanism prevents blinding and extends cloth life

drum cycles. Cloth life is extended, since there is no scraper abrasion or cutting action from particles held in threads of cloth.

Description: Cloth discharger can be attached to most any type of drum filter. Device permits sluice discharge as well as dry discharge.

Water-filled flexible rubber tube provides fluid tension to fabric. Basic compensating tension of water loop is retained by rubber tube roller. Solution to wash the cloth can be kept separate to recycle or to drain.

The wash solution (or air)

jets directly under cloth discharge cake. Jet action is aided by small radius of curvature of discharge roll to give clean sluice or dry discharge without scraper. Any suitable cloth may be used, with or without seams.

Device expedites recovering of potash brine from mud trailings at U.S. Potash Co.

Device has been in successful operation for past two years at U. S. Potash Co., where it is installed on a filter for recovering potash brine from mud trailings. The minus 325 mesh clay mud forms slimy, thin cake.

Brines are at elevated temperature and rapid cloth blinding from salting out would result if cloth were not washed every revolution. Since muds are sluiced to waste, relatively large amounts of water are used to provide ballast water in cloth tension loop, allowing excess overflow for sluice.

(Further information about cloth discharger may be obtained from Peterson Filters and Engineering Company, Salt Lake City, Utah.)

Check 2562 opposite last page.

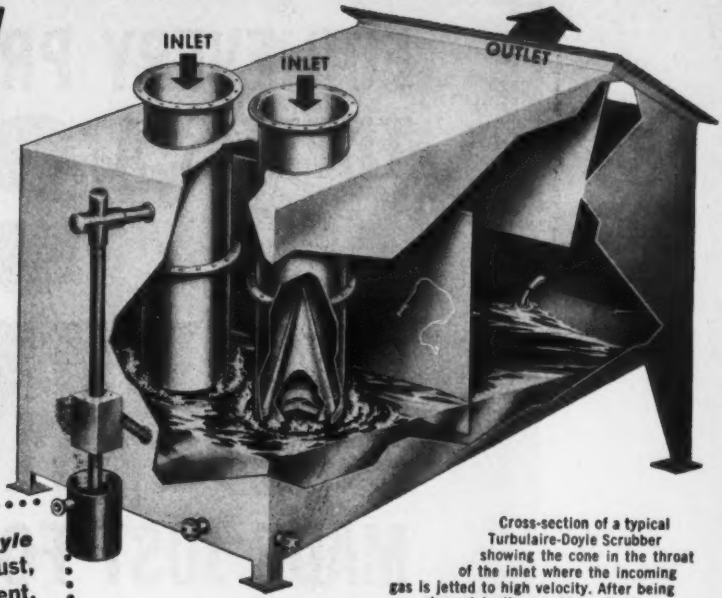
"Higgins made a mistake on that top-secret job."

NEW

Savings and efficiencies in Gas Scrubber Applications

with the

TURBULAIRE-DOYLE SCRUBBER



Cross-section of a typical Turbulaire-Doyle Scrubber showing the cone in the throat of the inlet where the incoming gas is jetted to high velocity. After being cleaned in the scrubbing fluid, the gas passes over spray eliminator baffles before it is discharged. Collected material is carried away by the circulating scrubbing liquid—is recovered as a liquid concentrate or slurry.

With addition of the Turbulaire-Doyle Scrubber to its line of advanced dust, fume and fly ash collection equipment, there is no industrial gas cleaning problem that Western Precipitation cannot handle with equipment of its own design. This assures your dust and fume control problem receiving the benefit of the industry's most complete "know-how" in all phases of gas cleaning operations.

The Turbulaire-Doyle Scrubber—a development of The Consolidated Mining and Smelting Company of Canada Limited and widely used in its own diversified operations—is now made available to industry by Western Precipitation Corporation under a license arrangement with Cominco.

Actual plant records, compiled over long periods of service, show the Turbulaire-Doyle Scrubber to be unique among commercially-available scrubbers in the multiple advantages it offers...

★ *High Collection Efficiencies*—generally 97% to 99%!

★ *Fine Particle Collection*—including those in the fume range!

★ *Low Liquid-to-Gas Ratio*—only 1 to 5 GPM per 1000 CFM!

★ *Wide Application Flexibility*—readily adaptable to various types of corrosion-resistant materials!

SIMPLE, TROUBLE-FREE DESIGN

The Turbulaire-Doyle Scrubber impinges dust-laden gas at high velocity into a bath of scrubbing liquid. The high velocity forces the gas and dust particles to penetrate deeply into the liquid for complete wetting and cleansing. A cone in the gas inlet nozzle, just above the surface of the scrubbing bath, provides the jetting action that assures outstanding performance from this unit. *There are no moving parts, nothing to require frequent maintenance!*

If you have dust or fume control problems where scrubber types of collectors are applicable, it will pay you to investigate the *years-ahead* advantages of the Turbulaire-Doyle Scrubber. Write, wire or phone the Western Precipitation office nearest you for further details.

TYPICAL APPLICATIONS INCLUDE:

Cleaning Gases from sintering machines, blast furnaces, roasters, dryers, calciners, crushers, screens, ventilators etc., in a wide range of chemical, metallurgical, rock products, and waste disposal operations.

Cooling and Humidifying Gases from fertilizer, acid, carbonating, smelting, alloying, and reclaiming operations where cool, moist gases are necessary for proper processing.

COTTRELL Electrical Precipitators
MULTICLONE Mechanical Collectors
CMP Combination Units
DUALAIRE Jet-Cleaned Filters
THERM-O-FLEX Hi-Temp Filters
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CORPORATION

Engineers and Constructors of Equipment for Collection of Suspended Material from Gases . . . and Equipment for the Process Industries

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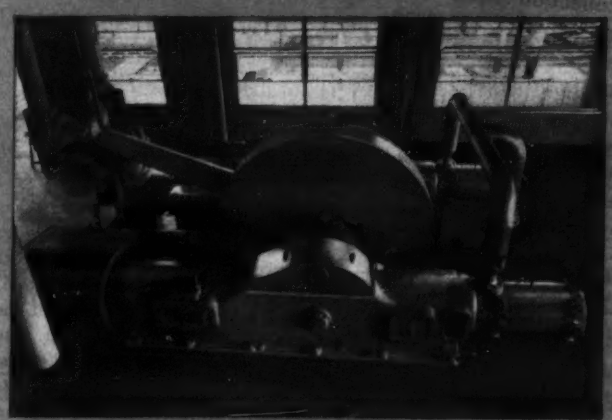
Precipitation Company of Canada Ltd., 8285 Mountain Sights Avenue, Montreal 9

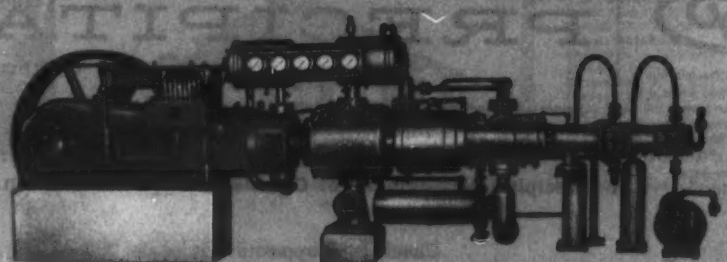
Check 2563 opposite last page.

FOR EVERY PROCESSING REQUIREMENT THERE'S A CP COMPRESSOR MADE JUST FOR THE JOB



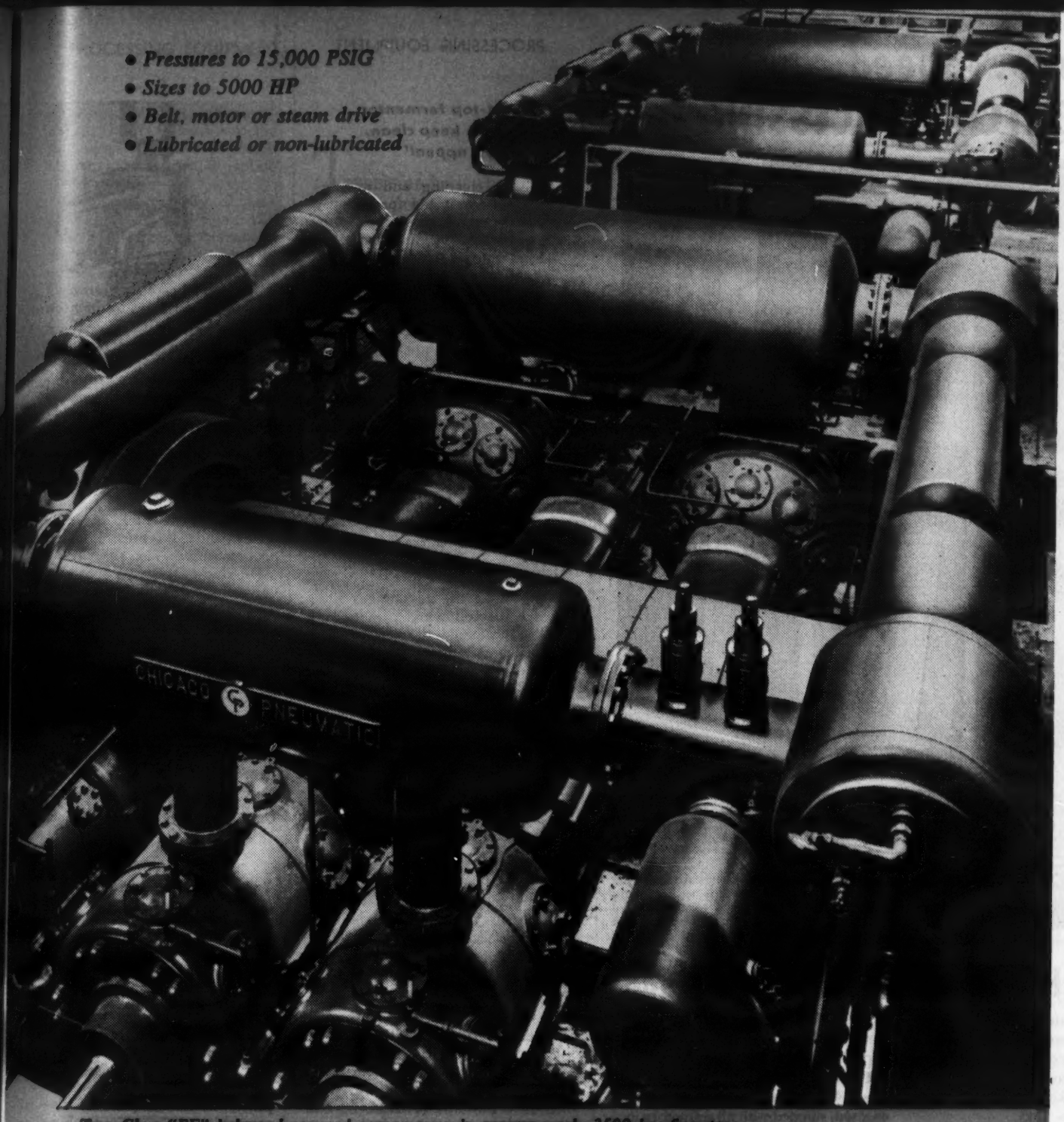
Class "H", steam-driven, four-corner, single-stage hydrocarbon gas booster.

Class "Y" butane compressor, coupled to an explosion-proof motor. In service in a large refinery.



Class "T", horizontal, straight-line, five-stage helium compressor. 6000 psig; 100 hp size.

- *Pressures to 15,000 PSIG*
- *Sizes to 5000 HP*
- *Belt, motor or steam drive*
- *Lubricated or non-lubricated*



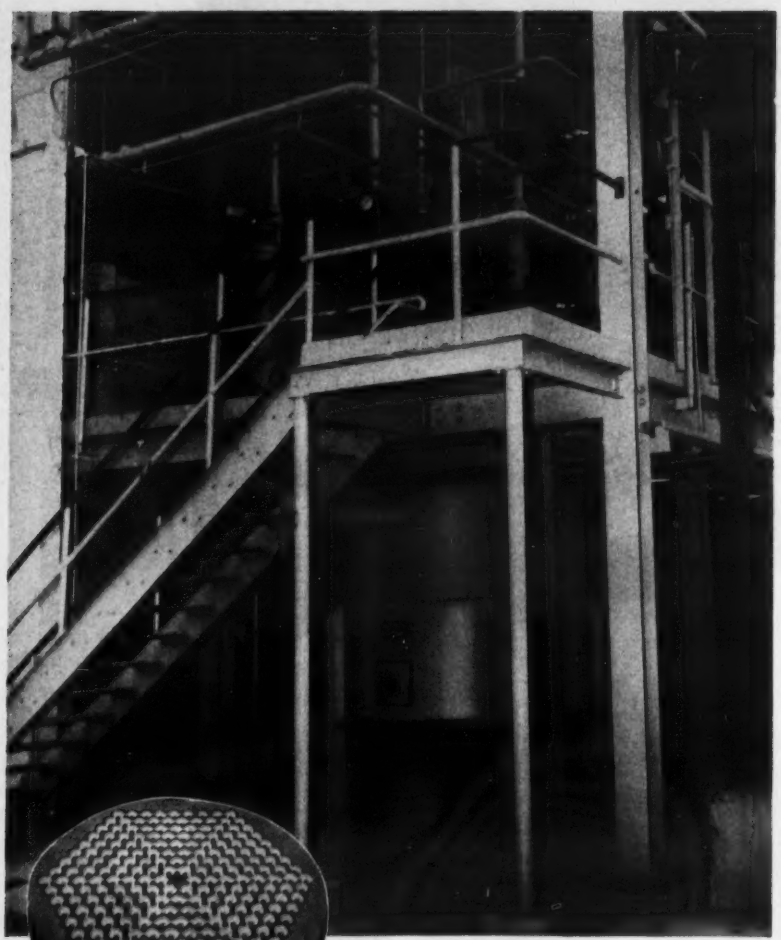
Two Class "FE" balanced-opposed compressors in process work. 3500 hp; five-stage.

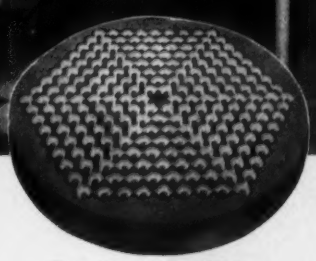
Chicago Pneumatic 8 East 44th Street, New York 17, N. Y.

AIR AND GAS COMPRESSORS • VACUUM PUMPS • PNEUMATIC TOOLS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS

For more information on product at left, specify 2564 see information request blank opposite last page.

Economy... Speed... Quality in BATCH PROCESSING





Duradiant Burner Setting

Plant Manager, Monsanto Chemical Co., Nitro, W. Va. reports: "This furnace is used to heat a 1,000-gal vessel and contents to an elevated temperature and to maintain this temperature for a predetermined period of time."

...with Selas Duradiant® Heating

Control in uniformity of heat application and adherence to critical programming requirements are important features of Selas Duradiant heating for batch cooking chemicals, oils, resins, varnishes, inks.

Fast, radiant gas heating, rapid burner response and turndown ratios of 15:1 or more, make Selas settings as versatile as they are controllable . . . enable them to meet any time-temperature cycle within ±2° F, and duplicate it, batch after batch.

Efficient, low-cost Duradiant enclosed or open settings are steel-encased, shipped with all refractory in place for simple installation. "Packaged" equipment may include shop-assembled piping and complete, automatic control instrumentation.

Send for bulletin "Heat Processing Batch Liquids." Address Dept. 1412.

SELAS CORPORATION OF AMERICA DRESHER, PENNSYLVANIA

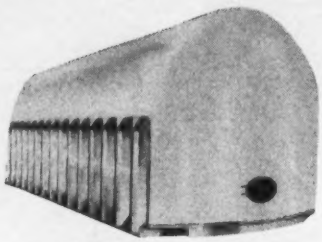
Heat and Fluid Processing Engineers

DEVELOPMENT · DESIGN · CONSTRUCTION

Check 2565 opposite last page.

Domed-top fermenter is easy to keep clean, has 'eye appeal'

Easy cleaning and maintenance is reported for recently developed "domed-top" fermenter. A decided departure from conventional designs, the stainless steel unit was developed to meet specific problems in the brewing industry.



Domed-top fermenter is decided departure from conventional designs

Among the advantages cited are the following:

1) Domed-top design reduces stiffener requirements at no sacrifice in strength.

2) Unit is eye-pleasing as well as functional.

3) Crevice-free . . . eliminating unnecessary tank corners simplifies cleaning.

4) Single-piece construction cuts manufacturing costs, speeds fabricating operations.

(Domed-top stainless steel fermenter is development of Process Equipment Division, A. O. Smith Corporation, Milwaukee, Wisc.)

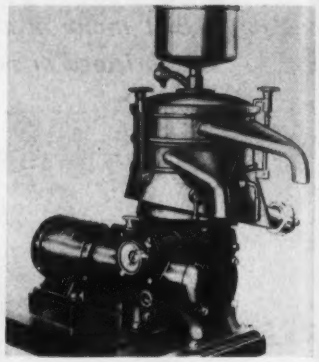
Check 2566 opposite last page.

Pilot plant centrifuges duplicate large-scale production conditions

Uses: Separating, clarifying, and concentrating liquids on pilot plant or small production scale.

Features: Centrifuges are small versions of production-size units. Units permit accurate determination of characteristics of processes involving continuous removal of solids.

Description: Two units are available — the SKOG separator and the SAOOH desludger. Former is recommended for use on liquids with solids contents up to 20%; latter for mixtures containing up to 5% solids.



Continuous separator can be used for either pilot plant production or lab research

Separator clarifies, concentrates, and separates. It can also classify solids.

De-sludger permits continuous solids removal or recovery with discharge of solids in a relatively dry state. Unit also performs three-phase separation — liquid-liquid-solid, with pressure discharge of the light liquid phase.

(SKOG-205 nozzle separator and Model SAOOH-205 automatic de-sludger are products of Centrico Inc., Englewood, New Jersey.)

Check 2567 opposite last page.

Up to 500 gph handled by simply designed 3-hp homogenizer

Uses: Dispersing, emulsifying, or blending various materials.

Features: Compact unit can handle as much as 500 gph using only one-third to one-half power requirements of conventional machines. Simplicity of design permits disassembly in 60 seconds. Machin is self-cleaning.

Description: Homogenizer has 380 splines in rotor-stator deliberately thrown out of register. These convert fluid flow from a constant rythmic vibratory pattern into an intermittent variable one. This causes subsonic effects which set up highly intensified turbulence in material being

processed. Violent interparticle attrition follows as the fluid mass is forcibly impacted through restricted spline vents.

Peripheral velocity of particles reaches 4500 rpm. Ultrasonic frequency vibrations are generated as particles impinge on the sonic blade. Continuous cavitation is set up within particles. This results in fully dispersed, smoothly blended, uniformly emulsified product.

Compact three hp machine occupies 18 x 18″ floor space. Unit weighs 250 lb. Larger models are also available. Field tests have shown that homogenizer is capable of continuous operation without

Compact homogenizer weighs 250 lb, occupies only 18 x 18" floor space

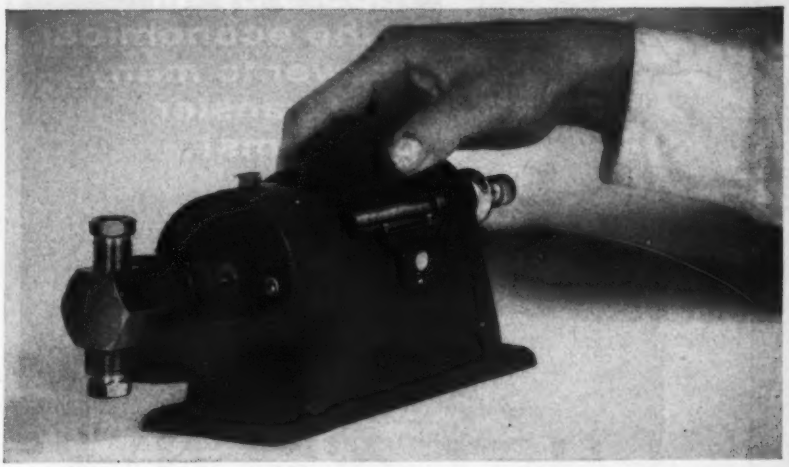
difficulty. Operating in an aerosol packer's plant, the three hp machine ran three shifts per day, seven days per week, for over six months with no down time.

(Jet-Mogenizer #30 is product of Buschman Products, Inc., 114 East 40 St., New York City.)

Check 2568 opposite last page.

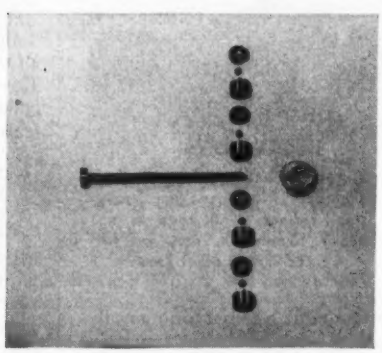
how to meter small quantities of liquid accurately

THERE'S no basic change in the physical properties of a liquid whether you pump large or small volumes. But as the volume being pumped approaches the milliliters per hour (ml/hr) range, several constant characteristics of liquids tend to become serious problems. Metering success depends on how well these problems are solved by pump design and operating practice.



Compressibility:

All liquids are compressible, but so slightly that there is rarely much cause for concern. In small volume metering, however, the 0.027% reduction in volume of water which accompanies each additional 100 psi pressure can represent a 0.3% loss in pumping efficiency. Thus the existence of high or fluctuating discharge pressures *must* be considered when choosing a micro pump.



Entrapped air:

Bubbles can be troublesome even in high capacity controlled volume pumps. But when you're metering at the rate of 1/60 *ml per stroke* to 0.3% accuracy, a bubble can spell disaster. Good pump design can minimize the bubble problem by speeding bubbles through the liquid end in a very few strokes, but only good pumping practice can eliminate it. In our experience, there is no substitute for a deaerator in the line.

Viscosity:

Low viscosity liquids tend to pass between any but the most perfectly mated ball checks and seats. Ball seating techniques recently introduced by Milton Roy have eliminated this problem, however, and extended the number of liquids that can be accurately pumped in small volumes. For example, a miniPump® is now successfully pumping 85 ml/hr of cyclohexane against a discharge pressure of 1,000 psi to an accuracy of ±0.6%.

Minute volumes also impose tight specifications on the pump itself. Plungers, balls, and seats must be finished to a degree of near perfection. Parts are inspected under powerful microscopes for any sign of imperfections. Proper mating of balls and seats is so critical that a rigorous functional test is necessary.

Solving these unusual problems demands such special equipment as the Milton Roy miniPump, *and* special pumping practices. Together they permit numerous metering jobs not otherwise possible. MiniPumps are standard equipment wherever small volumes of expensive or dangerous liquids are to be accurately metered into large process streams: perfumes into soap, dyes into cheese, odorants into natural gas, and hydrazine and other amines into boiler water. MiniPumps have also proved themselves in the chromatographic analysis of amino acids, feeding influent buffers to the columns and accurately introducing ninhydrin reagent to the effluent.

If precision pumping of small volumes of liquid is one of your problems, look to Milton Roy's 25 years of experience for your most economical solution. For more detailed information on miniPumps, write for Bulletin 1257-1. Milton Roy Company, 1300 East Mermaid Lane, Phila. 18, Pennsylvania.

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CHEMICAL INSTRUMENTATION SYSTEMS

Controlled Volume Pumps • Quantichem Analyzers
Chemical Feed Systems • pH Instruments

Check 2569 opposite last page.

The cooling of liquids and gases or condensing vapors by air is the economical answer to many heat transfer problems!
YOUNG

HC® HORIZONTAL CORE UNITS by Young

are specifically designed to handle a wide range of processing applications normally cooled by water!

HC® (Horizontal Core) Units are high-capacity, forced-draft air-cooled heat exchangers featuring vertical air discharge.

They are ideal for cooling acids, light or heavy end liquids, caustics, oils, or for condensing vapors or steam, or for maintaining temperature control of various types of solutions.

They are available in a wide range of sizes with capacities up to 25,000,000 Btuh for cooling water, or 10,000,000 Btuh for cooling oil. Parallel series installations of units can give unlimited cooling capacities. All units come equipped with motor and fans. They can be furnished with such optional accessory equipment as shutters, walkways and ladders, pumps, expansion tanks, thermostatic by-pass controls or air and sediment traps where required. Whatever your temperature problem, check with Young . . . they can help you solve it and save you money at the same time.

Write for catalog No. 557 Dept. 489-M

Young RADIATOR COMPANY
RACINE, WISCONSIN
Creative HEAT TRANSFER ENGINEERS
Executive Office: Racine, Wisconsin, Plants at Racine, Wisconsin, Mattoon, Illinois

Check 2570 opposite last page.

Vibrating ball mills have high output, low operating cost

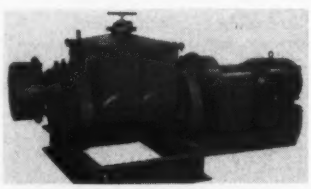
German-made units can handle toughest materials

Uses: Pulverizing, micronizing, and mixing wide range of materials in either wet or dry state — regardless of abrasiveness, hardness, toughness, or compactness.

Features: Vibrating ball mill permits high output at minimum processing time and low operating cost.

Description: Milling chamber of vibrating ball mill is balanced on heavy steel springs which function as supports for the chamber, suspending it freely, and isolating it from surrounding area. Machine requires no heavy foundation or special support. Unit may be located in any plant area.

Mill is driven by rotating eccentric mechanism using a patented coupling. This induces powerful vibration to mill chamber. Vibration causes balls to carom off walls



Vibrating ball mill's grinding chamber is balanced on heavy steel springs. Unit requires no heavy foundation, may be located in any plant area

and grind against one another in constant rotary motion. The fluid agitation of milling medium causes crushing, shearing, grinding, and attrition action.

Developed in Germany, the units are available in either batch or continuous production models. Batch units range in size from one pint to 55-gal capacities.

Continuous types may be used in conjunction with external classifiers for maximum output with critical levels of fineness. Units are available in standard or special materials of construction.

HIGH EFFICIENCY

DUCLONES®

assure maximum recovery at lowest cost

DUCLONES–Ducon high efficiency cyclones–are designed and constructed for high recovery efficiency and low gas resistance. Their sturdy construction assures long, continuous service with a minimum of maintenance.

The exceptional performance of Duclone collectors is the result of these 6 unique features:

1. **Small Diameter produces high efficiency**
2. **Helical Roof provides a turbulence-free path for the entering gas stream**
3. **Steep Cone improves dust separation**
4. **Dust Trap assures efficient dust removal from the cone**
5. **Vortex Shield prevents re-entrainment of dust in upward gas vortex**
6. **Scroll Outlet provides a low resistance clean gas outlet**

send for Bulletin C-958.

DUCON DUST CONTROL SYSTEMS AND EQUIPMENT

the name in DUst CONtrol

THE Ducon COMPANY INC.
147 EAST SECOND STREET • MINEOLA, L. I., NEW YORK

Check 2571 opposite last page.

Chamber walls can be lined with ceramic, rubber, or other products.

(Vibratom ball mills are distributed in North America by Schutz-O'Neill Company, 311 Portland Ave., Minneapolis 15, Minn.)

Check 2572 opposite last page.

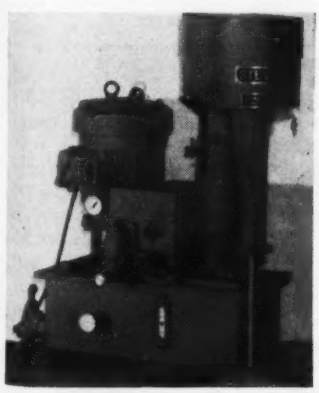
Heavy pastes mixed in matter of minutes by hydraulic unit

Permits processing 3 batches at one time

Uses: Mixing materials having viscosities up to thick pastes.

Features: Thick, heavy batches can be completely mixed in 10 to 15 min.

Description: Shrouded turbine impeller on mixer can be adjusted to revolve between zero and 2000 rpm. Hydraulic device permits impeller to be raised or lowered in kettle, with bridge swinging around in arc of 180°.



Shrouded turbine agitator on mixer can be raised, lowered, or swung around quickly by hydraulic arrangement

Units are available in 3, 10, 15, 20, and 25 gal sizes. For mass production, it is possible to place three mixing vessels around agitator. Operator can fill and unload two of the vessels while third is being mixed.

(Hydraulic mixers are product of The Stevenson Company, Wellsville, Ohio.)

Check 2573 opposite last page.

How Much Steam Should a Steam Trap Trap?

. . . some answers to commonly asked questions about the primary job of a steam trap

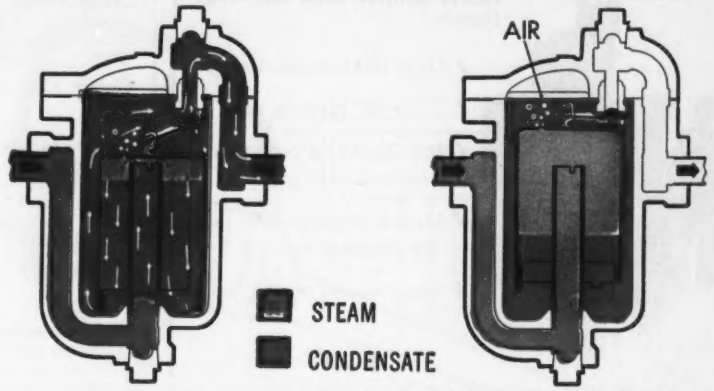
You don't need a doctor's degree in thermodynamics to answer the question at the top of this page. Naturally, a steam trap should trap *all* the steam.

Unfortunately for you, the problem isn't quite that simple. After all, a shut off valve would trap all the steam . . . and condensate, and air, and carbon dioxide as well.

So we'd better amend the answer to the question this way: A steam trap should trap *all* the steam but *must* remove condensate, air and carbon dioxide as rapidly as they accumulate.

With this established, let's take a closer look at what's involved:

HERE'S THE STEAM TRAP DESIGN THAT GETS RID OF CONDENSATE AND AIR WITHOUT STEAM LOSS



Trap open. Condensate entering trap has caused bucket to lose buoyancy. Weight of bucket times leverage pulls valve open. Air is discharged along with condensate.

Trap closed. Steam has floated inverted bucket; valve is held tightly closed by system pressure. Air entering trap passes through bucket vent and accumulates at top of trap.

A Steam Trap Should Trap All The Steam

If you've had experience with several different makes of traps, you already know that some trap steam better than others. The operating principle of the trap is what makes the difference. We like to talk about it because Armstrong traps are designed so that no steam can get to the orifice. The valve is always water sealed. Result: *More efficient steam utilization, lower fuel costs.*

A Steam Trap Should Remove Condensate

All traps remove condensate—after a fashion. For maximum efficiency in the unit being drained, though, the trick is to get it out without waiting for it to cool and without leaking steam.

Armstrong's water sealed valve takes care of steam leakage. The inverted bucket operating principle opens the trap for water regardless of its temperature. This means you get the condensate out as quickly as it accumulates. Result: *Higher temperatures and better heat transfer in steam heated units.*

A Steam Trap Should Remove Air and CO_2

Part and parcel of the condensate removal problem is removal of air as well as oxygen and carbon dioxide—two real troublemakers. Air tends to reduce operating temperatures and interfere with heat transfer. CO_2 goes into solution to form corrosive carbonic acid which, for example, can eat unit heater tubes. O_2 aggravates the situation. Believe it or not, but all traps don't properly remove air and CO_2.

By now, you've probably guessed that Armstrong traps *do* remove air and CO_2. Armstrong design (see illustration) provides continuous venting of air and CO_2. By opening suddenly, the Armstrong trap creates a momentary pressure drop to "pump" the air down to be vented. Result: *Higher temperatures, faster heat-up, better heat transfer and reduced corrosion.*

Note: When required, specially sized air vents are furnished. For fast heat-up of low pressure on-and-off units, Armstrong provides open float and thermostatic air vent traps.

What's the Final Answer?

Summing it all up, you'll get the best service from steam heated units that are equipped with traps designed to trap *all* the steam and remove air and condensate as quickly as it accumulates. In our prejudiced viewpoint, this means Armstrong traps. More important are the several thousand users of Armstrong traps who have proved the point.

Before you make up your mind, though, consider the minimum maintenance requirements of Armstrong traps . . . and the convenient assistance your local Armstrong Representative provides. These are important plus values.

Put Up or Shut Up

We're so confident that we "put up". Armstrong traps are unconditionally guaranteed to satisfy. So you can find out for yourself with practically no risk. If you're not completely satisfied with the way they do their job, you can get your money back.

* * *

The 44-page Armstrong Steam Trap book goes into greater detail on these and other Armstrong features. It also discusses trap selection, installation and maintenance. Ask your Armstrong Representative for a copy or write

Armstrong Machine Works
8806 Maple Street
Three Rivers, Michigan

ARMSTRONG STEAM TRAPS

"See our Catalog in Chemical Engineering Catalog".

Check 2574 opposite last page.

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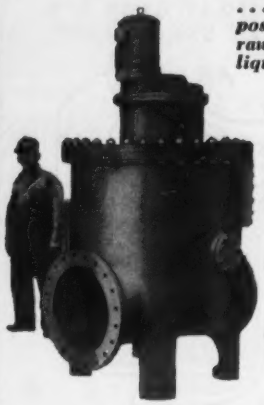
... for efficient removal and disposal of suspended particles from raw or process water and other liquids



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Check 2575 opposite last page.

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- Prevents material from being ground into belt.
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Check 2576 opposite last page.

NEW LITERATURE
Processing Equipment

Continuous impregnator for wood chips and other cellulosic materials is described in two-page bulletin. Diagrams show how unit compresses material, exhausts air and moisture from it, and then expands product in impregnation chamber, in presence of liquid processing chemicals. Bul 32 — Bauer Bros. Co., Springfield, Ohio.

Check 2577 opposite last page.

Factors to consider when choosing between filter press or leaf filter are outlined in four-page bulletin. "Filter Facts", volume 10, No. 2 — T. Shriver & Company, Inc., 892 Hamilton St., Harrison, N. J.

Check 2578 opposite last page.

Heat exchangers in five standard types are cataloged along with details on ranges, pressure and temperature ratings, and typical pressure drops in Bul 113—Thermal Research & Engineering Corp., Conshohocken, Pa.

Check 2579 opposite last page.

Impact mill which combines double-rotor action with lower rotational speed to achieve higher impact velocity is described in Contro Mil Bul—Entoleter, division of Safety Industries, Inc., PO Box 904, New Haven, Conn.

Check 2580 opposite last page.

Vacuum equipment and components are tabulated in 16-page products summary and price list. Over 600 listings are included. Vacuum Equipment Product Summary — NRC Equipment Corporation, 160 Charlemont St., Newton 61, Mass.

Check 2581 opposite last page.

Processing equipment for chemicals and pharmaceuticals is itemized in illustrated 24-page booklet. Units described include evaporators; drum, rotary, spray and pan dryers; flakers; coolers; and autoclaves. Cat 386—Buflovak Equipment Division, Blaw-Knox Company, PO Box 2041, Buffalo 5, New York.

Check 2582 opposite last page.

Use of marbles in wet-type dust collector is explained in six-page bulletin. Dimensions, specifications, and other data about four collectors, ranging in capacity from 1000 to 40,000 cfm are listed. Hydro-Filter Bulletin—National Dust Collector Corporation, 700 Machinery Hall, Chicago 6, Ill.

Check 2583 opposite last page.

Here's compact information to help you choose the right cylinders for all types of high-pressure gases—including oxygen, nitrogen, argon, ethylene and carbon dioxide. The bulletin tells why Hackney deep drawn, high-pressure gas cylinders save money on shipping charges, handling costs and maintenance. Gives complete data on styles, sizes, capacities and ICC specifications. Write today.

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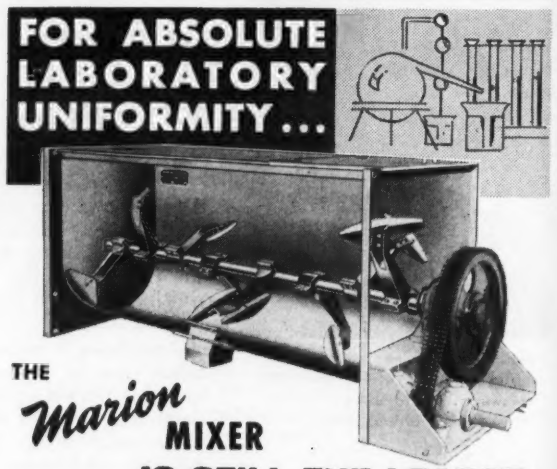

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A uniform mix is assured time after time, no matter how complicated the formula, and with laboratory exactness. If the formula is right —the MARION MIXER will mix it with complete accuracy.

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Check 2585 opposite last page.

Depreciation Dilemma

From page 27

and has been willing to do something about it.

My proposal to solve this problem can be stated very briefly:

- Allow taxpayers to adjust each year's depreciation provision, and the depreciation reserve, so that all depreciation, past and present, qualifying as a deduction from income for income tax purposes is stated according to its historic value adjusted to the current value of the dollar.
- Eliminate the name and concept of depreciation, substituting "Fixed Asset Amortization," and allow the taxpayer to set his own rates of amortization for income tax purposes.

The article by Mr. Davis has very ably covered part of the subject. There are, however, four points about the proposal I would like to emphasize:

- Dollars spent in the past would be recovered in terms of current purchasing power.
- Overstatement of earnings would be reduced.
- Payment of taxes out of money really recovered for capital replacement would be eliminated.
- Eliminate most of the controversy (and consequently much of the attendant cost) between taxpayers and the IRS regarding rates of capital recovery.

All arguments against this proposal stem from two reasons:

- Today's apparent need (or greed) with a sacrifice of tomorrow's gain.
- Failure to recognize the "change in concept" of capital recovery in an expanding business economy subjected to high income taxes.

In the meantime, why would it not be a good idea to urge companies to include in their annual Profit and Loss Statement and Balance Sheet an indication of how much extra taxes they have paid because this inflationary effect has not been recognized?

William T. Barker, Nashua, N. H., has this solution to the problem:

It seems to me it is necessary to gage depreciation dol-

How B&W JOB-MATCHED TUBING solves any stainless pressure tubing problem

When you call on B&W for your stainless tubing requirements you can get:

... extra-long tubes (even 90-foot,* for example) if they are most suitable for your installation

... a wide range of stainless analyses permitting a choice of the one grade best for your job

... uniform mechanical properties and dimensions for ease of bending, welding or other fabrication

*manufactured by welding to obtain length

These are just a few of the reasons it pays to specify B&W Job-Matched Stainless Steel Tubing. Call your local B&W District Sales Specialist, or write for Bulletin TB-355 for full information. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pa.

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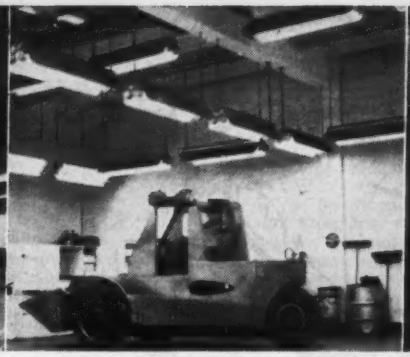
"EFU" Explosion-Proof Fixtures Give Safe, Bright Illumination in Paint Plants . . .



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Modern, 45° Angle Mount in Garage Pits . . . or Wherever Safe Lighting is Required

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Type "EFU" 2-Lamp Fixture 45° Angle Mounted and Suspended From Type "ESS" Swivel Mounted On "GRFC" Flanged Unilet With Canopy

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Quality built in every detail, APPLETON "EFU" fixtures are prefectly designed and carefully constructed by experienced craftsmen. Factory sealing eliminates the need for external seals. In addition, all models have cast aluminum end housings containing terminal blocks where line connections are made, and aluminum threaded covers to protect line connections, starters and lamps from hazardous fumes, dirt or dust. All lamps are protected and totally enclosed by heavy Pyrex glass tubes. APPLETON "EFU" fluorescent fixtures are U.L. and C.S.A. approved and meet specifications of Article 500 of the National Electric Code.

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- Choice of 33 different models (see chart below)
- Available in 2, 3, or 4 lamp styles
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Circuit Voltage 60 Cycle	40 WATT, 48 INCH T-12			100 WATT, 60 INCH T-17—BI-PIN		No. Lamps
	Bi-Pin		Single-Pin Instant-Start Slimline			
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110—125	•	•	•	•		2
	•	•	•			3
	•	•	•	•		4
199—216	•					2
	•					4
220—250	•	•	•			2
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Check 2587 opposite last page.

Depreciation Dilemma

From preceding page

lar allowances by two yardsticks as I look at Mr. Davis' timely article.

First on the basis of depreciation by use, wear, corrosion—just plain old age, with no factor of technological obsolescence involved—it would seem reasonable to allow an increased dollar replacement value, adjusted by the value loss of the dollar due to inflation, adjusted annually, for depreciated equipment.

For example, if equipment cost $500,000 in 1939 and it was to be depreciated over a 14-year period, and the "sum of the digits" $(1 + 2 + 3 \ldots + 14)$ method were to be used, the first year's normal depreciation would be $14/105\text{th} \times \$500{,}000 = \$66{,}700$.

But to compensate for two percent inflation in this first year, it should be allowable to multiply the $66,700 by a factor compensating for the two percent inflation. So doing, $\$66{,}700 \times 1.02 = \$68{,}000$. Succeeding years' depreciation would be similarly adjusted so that dollar reserves would cover the entire cost of "wear out" replacement.

Second, for faster replacement when needed because of technological obsolescence, standards of rate of obsolescence might be established by a government-chemical industry advisory group to the tax authorities.

Another Birmingham reader, who requested anonymity, offered these thoughts:

The facts Mr. Davis mentioned are certainly disturbing to many technical and production people. To me, it seems only reasonable that the depreciation formula should reflect the replacement cost in an economy characterized by a continued inflationary spiral.

As for inflation, I wonder where we will ultimately find ourselves. We have regular and continued rounds of general wage increases, often apparently unaccompanied by corresponding improvement in productivity. On the contrary, hasn't worker production efficiency actually decreased? It

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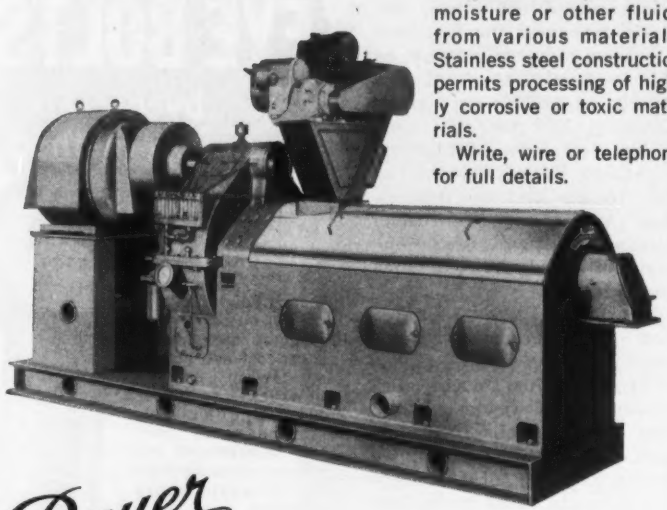

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Check 2588 opposite last page.

DURABILITY WITH SILENCE —no water hammer!

Good news at the new Chicago Sun-Times Building! Williams-Hager *Silent* Check Valves protect the air conditioning and related piping systems. Water hammer and surge pressures are controlled by closure of valve before reversal of flow starts or when flow is zero.

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Williams-Hager Silent CHECK VALVES

Write for Bulletins —No. 851 on Cause, Effect and Control of Water Hammer. No. 654 on Valves.

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Our 73rd Year • 1886-1959

Check 2589 opposite last page.

seems so to me.

W. E. Kress, assistant manager, alkylation, Shell Oil Company, Wood River, Ill., is worried about inflation in the following letter:

Mr. Davis' article is not a lone cry in the wilderness with respect to taxation and inflation. Unfortunately, it does not receive the attention it and others like it should get.

My belief coincides with Mr. Davis' in that continuing inflation is a cancer in our nation's financial health. Mr. Davis' idea of a sound depreciation policy in our taxing system, however, is just another of dozens of ideas chipping away at inflation.

The basic cause of inflation is excessive government spending and, in particular, deficit spending. If we are to have a stable dollar we must have stable government spending.

My colleagues, who now spend all their time in technological and management improvements, in their day-today tight little circle must learn to devote some time, energy and ideas on influencing our government toward sound fiscal policies.

Further, we must learn and then teach on a wide basis not to demand government services that tend toward inefficiencies and loose spending practices.

It is about time that the fair share of this country's brainpower which resides in management is partly devoted to insuring our country's future for our children and our children's children.

In his comments, D. W. Lanning, Deer Park, Texas, wonders if economic health does not depend upon rapid population growth. Here's what he has to say:

T. C. Davis presented some pessimistic ideas on inflation. In 1776, Adam Smith ("Wealth of Nations") also noted the inflationary spiral and properly attributed it to the opening of the frontier. Concern about inflation now after 450 years of it is pertinent to our future, however. The frontier is large-

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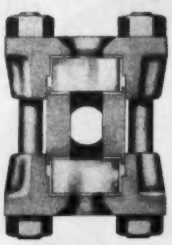
HIGH PRESSURE GAUGES

USED IN REFINERIES AND CHEMICAL PLANTS THROUGHOUT THE WORLD



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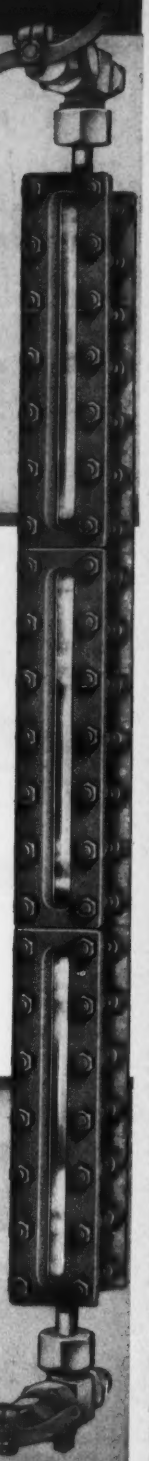

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100 SERIES

General Purpose Valve for service to 10,000 psi

The O-ring stem seal design on this new, low-priced valve makes it permanently LEAK-TIGHT*. Use the 100 Series where you need an inexpensive, heavy duty valve for either pneumatic or hydraulic service. It's ideal for throttling, regulating, or shut-off applications over a temperature range of –40° to 200° F. Male or female connection and panel mounting, if needed.

- GUARANTEED leak-proof O-ring seal
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- Safe, integral bonnet
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300 SERIES

Forged Needle Valve with Plastic Stem Tip

The same unique stem design used on the 100 Series, plus a new plastic stem tip, makes Hoke's 300 Series valve LEAK-TIGHT* for life at both stem and seat. Made of long wearing nylon or corrosion-resistant Kel-F, these plastic stem tips have taken twice the normal closing force through 700 cycles of operation at 3500 psi – with no sign of leakage across the seat! Available in brass or stainless steel bodies, for service to 3000 psi. Panel mounting, too.

- Minimizes seat and stem point damage due to grit and over-torquing
- Provides vapor or vacuum leak-tight closure
- Minimizes opening pressure surges
- Service up to 3000 psi
- In 1/8" and 1/4" pipe sizes and 1/4" tube size

These are just two products in Hoke's extensive line of small, quality valves. If you would like our new Catalog GC959, or sample valves, write to us on your company letterhead.

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Check 2591 opposite last page.

Depreciation Dilemma

From preceding page

ly gone. A new equilibrium will result.

The frontier was also of primary importance to the development of capitalism. Mr. Davis expressed the fear that American industry may not be able to supply the needs of a rapidly expanding population. Consider, however that capitalism *requires* continuing expansion. With the passing of the frontier and its tremendous consumption, is not rapid population growth (and consumption) necessary for economic health?

Mr. Davis also suggested that depreciation allowance should be based on replacement cost. This smacks of a continuum of book juggling that would probably create such an odor (whether deserved or not) of chicanery that it might cause more than mere criticism of our economic system.

National Distillers

From page 29

they're looking for a diversification proposition," Bierwirth said.

Within weeks, a consultant had studied Panhandle's product and distribution system. It was reported that the gas going to Michigan and Ohio contained an unusually high percentage of ethane and heavier hydrocarbons, and that the Tuscola, Illinois, site of a new junction and pumping station offered attractive possibilities for a chemical plant.

Hulse ran through economic studies and came up with about 300 tons of ethylene/day as an optimum figure to shoot for. Ethane and heavier hydrocarbons would be extracted from the gas stream. Ethane would be cracked to ethylene which would be purified and used for synthesis. The heavier hydrocarbons would be marked as LPG.

Soon, National Petro-Chemicals Company was formed, N-D owning 60 percent and Panhandle 40. Hulse was made

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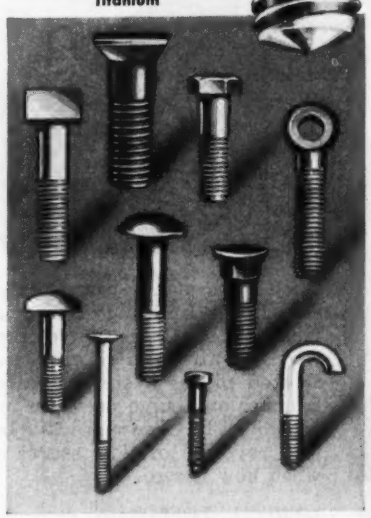
lower cost
EYE BOLTS
by an exclusive method

Among Pawtucket's many specialty products are these lower-cost eye bolts or "swing" bolts. Pawtucket's exclusive production method keeps cost low, dimensional accuracy unusually high and strength above standard.

Pawtucket eye bolts are made in standard sizes 1/4" and larger, or to your specifications. In any size, you can depend on uniform Class 3 fit, if required.

All standard steels, stainless steels and non-ferrous metals, including Titanium



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MANUFACTURING COMPANY
327 Pine St. • Pawtucket, R. I.
THE PLACE TO SOLVE YOUR BOLT PROBLEMS
T.M. REG.
"The Bolt Man"

Check 2592 opposite last page.

executive v-p. "Get long-term contracts for at least 75 percent of the plant's capacity of alcohol and ethyl chloride," Bierwirth admonished, "then we'll go ahead with the plant."

Hulse went to Du Pont and within a few days had sizeable contracts for both products. A little later, Commercial Solvents and then U.S. Industrial Chemicals Company signed for alcohol. With Olmsted, he contracted with Phillips to take the LPG. Contracts were let with engineer-constructors for turnkey plants of standard designs.

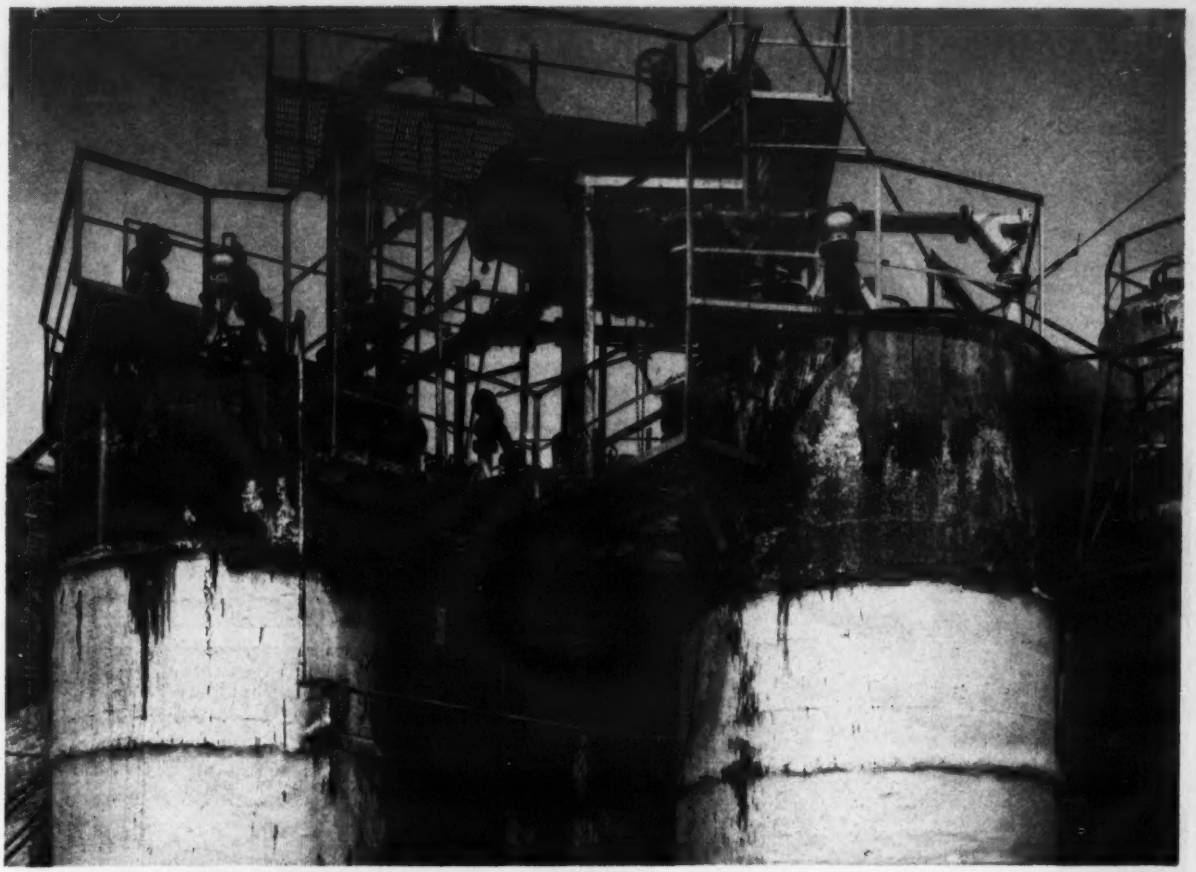
More $$$$

"Those days," recalls Hulse, "were fantastic. We knew we were just scratching the surface of a great petrochemicals venture. I was worried about one thing. From my Du Pont training I was aware that unless caught early, we might build into these new plants bottlenecks that would be expensive to try to rectify or expand later. Compressors would be a good example. The thing I tried to do was to buy big enough units for later expansion." This added costs.

"Every few weeks it was another million or so," reflects Bierwirth. "I'm not sure that we'd have had the nerve to go ahead with the job if we'd known at the beginning what it was going to cost." By mid-1953, about $55 million had gone into the $44-million project. Part of the increased costs arose through the necessity to drive pilings under most of the plant's foundations. Delays were brought on by a steel strike. One contractor left the charge for his services out of a sizeable contract, which had to be upped 8 percent. Some early polyethylene expenses were also included in this figure.

In addition to the joint-venture outlay, USI on its own built adjoining plants. These were for air liquefaction, ammonia, nitric acid, nitrogen solutions and sulfuric acid. Needing hard-to-get chlorine, USI acquired Algonquin Chemical Company and also got caustic and sulfuric acid facilities.

To next page



at FLINTKOTE'S Chicago Heights plant:

13 years continuous operation prove advantages of TURBO asphalt oxidizers

Thirteen years ago three General American TURBO asphalt oxidizers were installed at Flintkote Company's Chicago Heights plant. The units were piped to operate either individually as batch oxidizers for special products or in series for asphalt blowing. They require less than 15 hp each, and each is capable of handling up to 1000 cfm of air. They afford a rise in the melting point of asphalting material, varying from 12 to 20 degrees per hour, depending on the type of flux being produced.

For thirteen years the units have been in continuous operation, providing advantages of low power consumption, high air efficiency and accurate control of product specification.

The Flintkote installation is typical of TURBO asphalting equipment installed during a 25 year period to give higher production rates per still, lower power costs and less down time. TURBO units are safer to operate, need less top steam and less firing because of greater heat generation in the asphalt.

Ask for a TURBO engineer to discuss application of TURBO equipment to your needs.

FOR DETAILED INFORMATION AND USEFUL DESIGN DATA, SEND FOR THE FOLLOWING BULLETINS:

Please send me the following Turbo-Mixer Bulletin (s):

General Turbo-Mixer Bulletin_____

RDC Extraction Column Bulletin_____

Process Equipment Division

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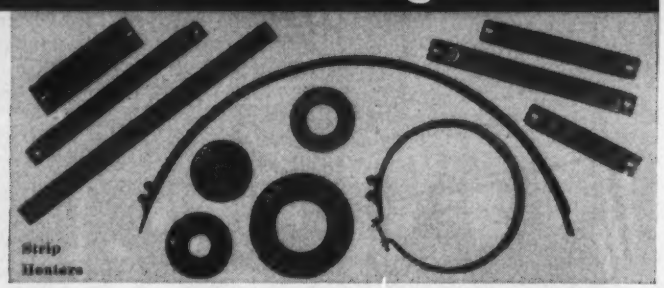
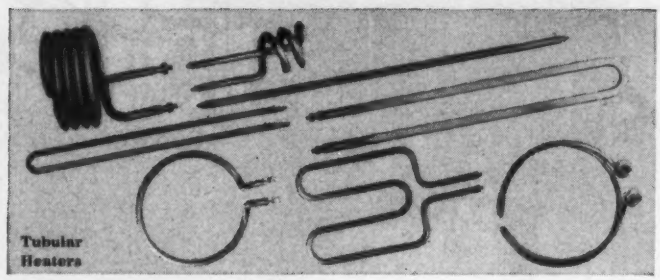
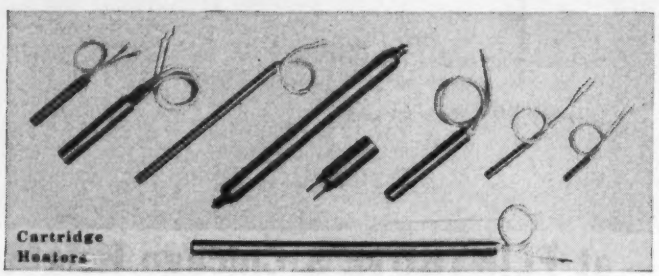
Check 2593 opposite last page.

Call your CHROMALOX Man for the heating answers







These 3 basic CHROMALOX heaters provide answers to just about any heating problem

Strip Heaters . . . that quickly and easily bolt or clamp to platens, dies, kettles, tanks, pipes, rolls, drums, ovens and air ducts. Lengths from 4 to 96 inches, widths from ¾ to 2½ inches, with cross section curving or lengthwise bending. Available with brazed-on fins.

Tubular Heaters . . . that clamp on, fit into machined grooves, cast into metals, immerse in liquids, install in ovens and ducts. Straight lengths or factory-formed to nearly any contour. Lengths from 6 inches to 30 feet. Triangular or round cross section. Available with brazed-on fins.

Cartridge Heaters . . . that smoothly fit standard drilled holes in dies, platens, molds, extrusion and injection barrels. Special leads available for protection against flexing action, abrasion, moisture or vapors. Diameters from ⅜ to 1¹⁵⁄₆₄ inches, lengths from 1⅝ to 25⅜ inches.

Versatile Chromalox electric heaters are available in sheath materials and wattages to match almost any application to 1100°F. Easy to install, they are fast, clean, safe and economical.

Your Chromalox Man can help you determine the one that best answers your specific problem. He's backed by the world's largest factory stock of industrial heaters, ready for immediate shipment. Why not give him a call. You'll find his phone number listed at the right.

Our new Catalog 60 provides detailed product information and suggests numerous applications for the complete line of Chromalox electric heaters for industry. If you have not yet received a copy, please let us know. 1801

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National Distillers

From preceding page

Getting a Sales Force

In 1951, N-D made moves toward equipping itself with a sales force. Bought from Air Reduction was a 25-percent interest in U.S. Industrial Chemicals Company. Later that year, a merger took place between N-D and USI. Bierwirth lost little time selling off unprofitable or unassimilable divisions, partly to raise cash. Disposed of were a Cuban subsidiary, fermentation plants, and the insecticide, alkyd resin and antifreeze operations.

The USI nationwide sales staff, primary property left from the prunings, was headed by able administrator William F. Marsh Jr., USI's president. Hulse promptly gave Marsh responsibility for sales and staff functions while devoting his own energies to engineering, production and research.

Deprived of most product lines, the USI sales force grew somewhat restive waiting for the agricultural and heavy chemicals production to reach commercial levels. "When polyethylene came in," recalls McCarthy, "the boys really welcomed it." In June 1956, a phosphoric acid plant was being built.

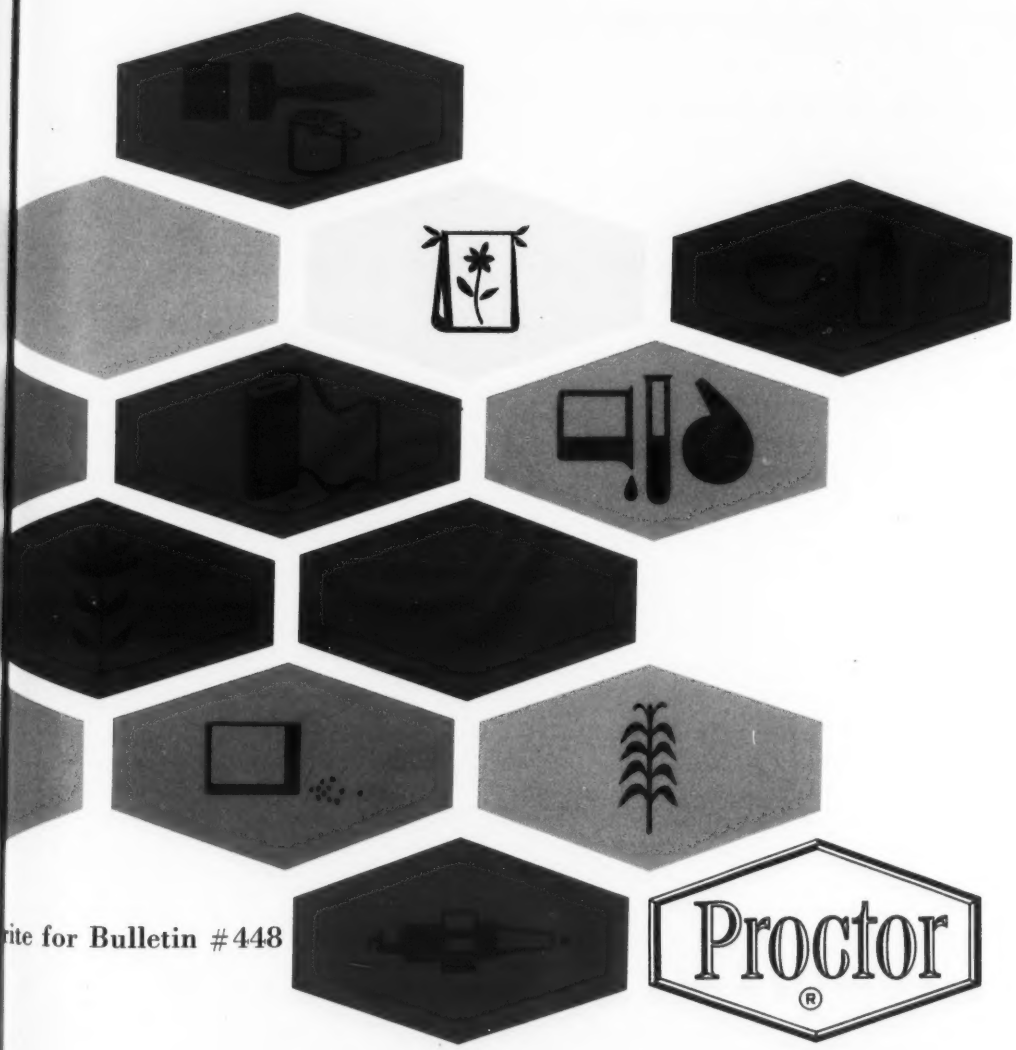
Operating Problems

It is not uncommon for chemical processing plants to not immediately function as expected. This plagued the Tuscola operations. For more than a year the ethylene facilities balked at producing more than 50-percent design capacity — holding up dependent operations. Synthetic alcohol originally had a petroleum-like odor, requiring redistillation.

The air liquefaction plant suffered from cryogenic industry overconfidence in safety of the low-temperature units. A minor explosion — somewhat similar to those had by other operators — did little damage but affected operation

For more information on product at right, specify 2595 . . . see information request blank opposite last page.

PROCTOR Drying Equipment for the Food, Chemical and Process Industries... Conveyor Dryers, Spray Dryers, Tray Dryers Truck Dryers... Continuous Automatic Production of the World's Finest Products



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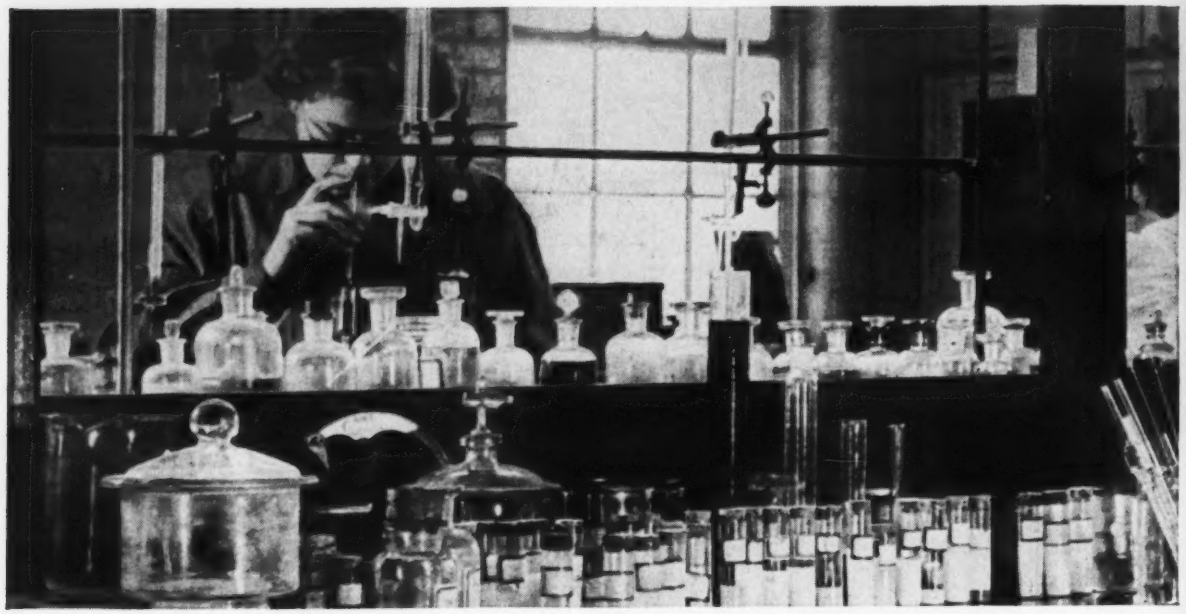
THE U. S. TREASURY SALUTES THE CHEMICAL INDUSTRY



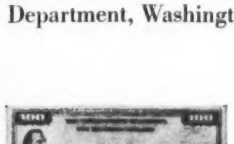
—and its people who buy Savings Bonds and strengthen America's Peace Power

Every family and every industry in this country benefit, directly and indirectly, from the work of our great chemical industry. Those whose lifework is in chemistry may well take pride in the vast good that stems from their profession. Thousands upon thousands of people in the chemical field are proud, too, of their share in America's Peace Power, for they are making regular purchases of U.S. Savings Bonds.

Buying Shares in America through the Payroll Savings Plan is a convenient and systematic way to practice thrift. It helps these patriotic people enhance their resources for home building, for education and for greater security after retirement.

If your company has not yet installed a Payroll Savings Plan, start at once. The easy first step is to telephone your State Savings Bond Director for the help he will give you, gladly. Or write to Savings Bonds Division, U.S. Treasury Department, Washington 25, D. C.

JAMES C. VICKERS is pictured here practicing his highly specialized skills in one of our country's great chemical plants. Mr. Vickers is typical of the thousands of expert workers in this field who are buying U.S. Savings Bonds regularly. Mr. Vickers uses his company Payroll Savings Plan to make regular contributions to the Peace Power of his country.



CHEMICAL PROCESSING

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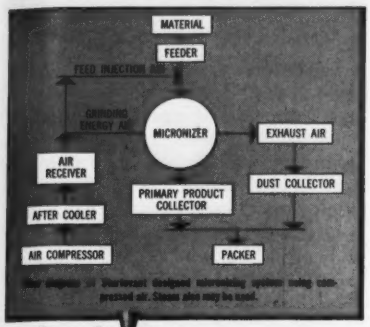
Need ½ to 44 Microns?

Sturtevant Micronizers* Make 325 Mesh Obsolete



One Operation Reduces, Classifies

Sturtevant Micronizers grind and classify in one operation in a single chamber—provide fines in range from ½ to 44 microns to meet today's increased product fineness needs. Can handle heat-sensitive materials.

Production Model (15 in. chamber)

No Attritional Heat

Particles in high speed rotation, propelled by compressed air entering shallow chamber at angles to periphery, grind each other by violent impact. Design gives instant accessibility, easy cleaning. No moving parts.

Classifying is Simultaneous

Centrifugal force keeps oversize material in grinding zone, cyclone action in central section of chamber classifies and collects fines for bagging. Rate of feed and pressure control particle size.

Eight Models Available

Grinding chambers range from 2 in. diameter laboratory size (½ to 1 lb. per hr. capacity) to large 36 in. diameter production size (500 to 4000 lbs. per hr. capacity). For full description, request Bulletin No. 091.

Engineered for Special Needs

A 30 in. Sturtevant Micronizer is reducing titanium dioxide to under 1 micron at feed rate of 2250 lbs. per hr. For another firm, a 24 in. model grinds 50% DDT to 3.5 average microns at a solid feed rate of 1200-1400 lbs. per hr. A pharmaceutical house uses an 8 in. model to produce procaine-penicillin fines in the 5 to 20 micron range. Iron oxide pigment is being reduced by a 30 in. Micronizer to 2 to 3 average microns.

Sturtevant will help you plan a Fluid-Jet system for your ultra-fine grinding and classifying requirements. Write today.

Can Test or Contract Micronizing Help You?

Test micronizing of your own material, or production micronizing on contract basis, are part of Sturtevant service. See for yourself the improvement ultra-fine grinding can contribute to your product. Write for full details. STURTEVANT MILL CO., 119 Clayton St., Boston, Mass.

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Check 2596 opposite last page.

of the ammonia plant for months. USI is cooperating with other operators to exchange information intended to prevent recurrences.

Consolidation of all chemical operations under the name, U.S. Industrial Chemicals Div. of National Distillers and Chemical Corp., took place early in 1958, following the acquisition by N-D of Panhandle's interest in National Petro-Chemicals. Hulse was made executive v-p and general manager; Marsh v-p and assistant general manager.

Zirconium and Titanium

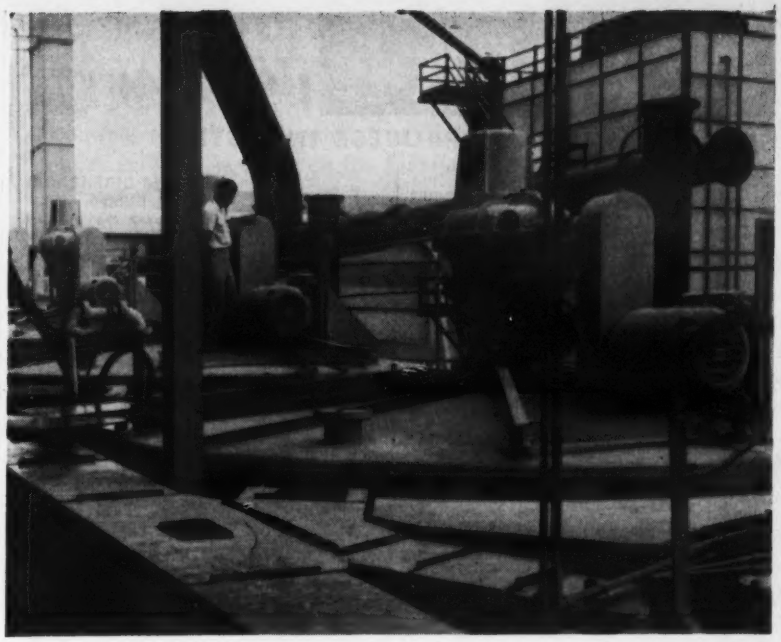
One of the continuing problems of sodium producers is to keep uncovering new uses for the expensively reactive metal . . . sodium has had a consistent history of technological obsolescence. About two years after the Ashtabula sodium operation was started, N-D enlarged it in anticipation of further growth of the synthetic detergent market. Unfortunately that use disappeared when P&G announced a new hydrogenation step, which would eliminate the need for sodium.

High Research Level

Such recurrent obsolescence prompted management to maintain a high level of research activity towards the development of new uses for sodium, N-D's R&D Center, under the direction of v-p research, Dr. Stuart Schott, currently employs 200 professional people.

For some time the N-D Research Center had been working on a titanium and zirconium process based on sodium. Pilot plant studies showed indications of savings over the Kroll process, so N-D had the interest of the Defense Department and the AEC. A production facility was erected at Ashtabula, and for a while it appeared that these new metals would be in large volume demand.

The plant was showing substantially reduced costs when the Government in 1957 drastically curtailed the program. Shift of emphasis to missiles



How to stir up 700 tons of rock

Every day, more than 700 tons of phosphate rock and 600 tons of 98% sulfuric acid cascade into these big tanks.

Out of the tanks come 650 tons of 32% P_2O_5 phosphoric acid and many more tons of coarse, uniform, fast-filtering gypsum.

How does American Cyanamid Company handle this mammoth mixing job at its big triple superphosphate plant in Brewster, Fla.? *With just six* LIGHTNIN *Mixers.*

Controlled mixing Designed, engineered and equipped by Dorr-Oliver, this plant utilizes one 30-hp and five 60-hp mixers to handle the entire mixing load in its two huge premixers and four reactors. They provide the intense but closely controlled agitation needed for top yields.

Turbine-type LIGHTNIN Mixers also keep seed tanks mixed uniformly in the plant's three-stage vacuum evaporator system where phosphoric acid is concentrated to 54%. Still other LIGHTNIN Mixers help to neutralize process water and acid wastes in the efficient water-reclamation system.

What this means to you No matter how big—or how small—you want your fluid-mixing operations to be, you get *guaranteed* results when you mix with LIGHTNIN Mixers. For service and equipment that help you get a process onstream faster . . . trim your mixing costs to a minimum, see your LIGHTNIN Mixer representative. He's listed in Chemical Engineering Catalog. Or write us direct.

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MIXING EQUIPMENT Co., Inc., 185-n Mt. Read Blvd., Rochester 3, N. Y.

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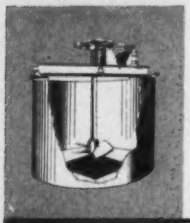
Check 2597 opposite last page.

DENVER Equipment

FOR THE CHEMICAL PROCESS INDUSTRY

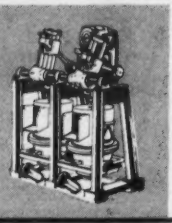


DENVER AGITATORS AND MIXERS

Agitator types available: Turbine-type propeller (to 120" in tanks to 50' dia.), slow speed, high speed, air lift, vertical turbine mixers, mixer-settler units.

Write for Bulletin No. A2-B2

Lab and pilot scale agitators in LG3-B10

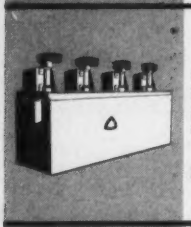


DENVER DIAPHRAGM PUMPS

Stroke can be adjusted while pump is operating. Long wearing nylon-reinforced rubber diaphragm. Sizes 1" to 10" simplex and duplex, capacity to 1000 g.p.m.

Write for Bulletin No. P8-B12

Lab and pilot scale diaphragm pumps in LG3-B10



DENVER ATTRITION SCRUBBERS

High power input to efficiently remove sand coatings, mix dense slurries. Rubber lined or acid-proof tanks. Sizes to 56"x 56".

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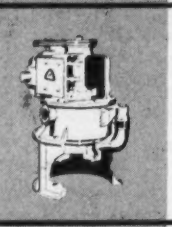
Lab and pilot scale scrubbers in LG3-B10



DENVER VERTICAL CENTRIFUGAL PUMPS

For handling frothy liquids or coarse, sandy slurries, constant or intermittent flow. No packing gland or sealing water. Standard or stainless steel construction. Capacity to 450 g.p.m.

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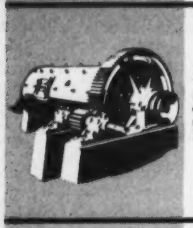
Lab and pilot scale vertical centrifugal pumps in LG3-B10



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Offer operation and convertibility. Wet or dry grinding systems. All steel construction. Ceramic or rubber linings available. Sizes to 10'x 20'.

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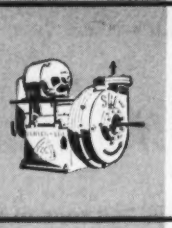
Lab and pilot scale mills in LG3-B10



DENVER SRL (RUBBER LINED) PUMPS

High efficiency, low horsepower. Parts last longer, cost less. Rubber lined. PUMPS AND PARTS IN STOCK. Sizes to 5000 g.p.m.

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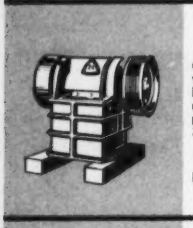
Lab & pilot scale SRL pumps in LG3-B10

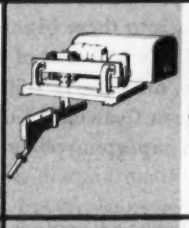


DENVER JAW CRUSHERS

Cast steel frame, anti-friction side bearings and bumper bearings. Manganese steel jaw and cheek plates. Sizes from 2¼"x 3½" to 36"x 48".

Write for Bulletin No. C12-B12

Lab and pilot scale crushers in LG3-B10



DENVER SAMPLERS

Continuous mechanical and automatic types for dry, solution or slurry sampling. Complete sampling plants and sample processing equipment. SAMPLERS IN STOCK.

Write for Bulletin No. S1-B4

Lab and pilot scale samplers in LG3-B10

DENVER REAGENT FEEDERS

Both wet and dry feeders available. Let us know your requirements. Many standard units in stock.

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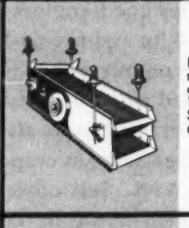
Lab and pilot scale feeders in LG3-B10



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For efficient wet or dry screening. "True-Circle" eccentric action. Sizes to 6'x 14' in stock. Also Trommel Screens in sizes from 30"x 60"x 120".

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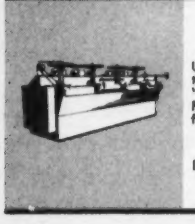
Lab and pilot scale screens in LG3-B10



DENVER "SUB-A" FLOTATION

Universal tank with three types of mechanisms: (a) "Cell-to-Cell"; (b) "Free-Flow"; (c) Type "M". Sizes from 16"x 16" to 72"x 72".

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Lab and pilot scale flotation in LG3-B10

DENVER SPIRAL RAKE THICKENERS

Move settled materials to center in one revolution. Simple, efficient, heavy-duty gear mechanism for thickeners to 150' dia. Acid proof construction available.

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Lab & pilot scale thickeners in LG3-B10

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National Distillers

From preceding page

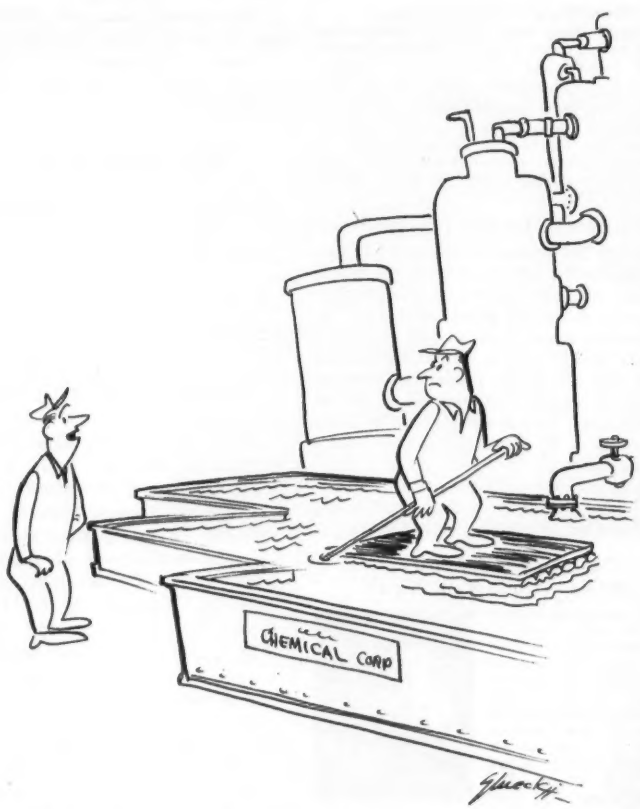
where high-temperature stainless steels were needed shrank the titanium market.

In the meantime, to get a more integrated position with regard to metals, N-D sold its metal facilities to Mallory-Sharon Metals Corporation, now owned 1/3 each by N-D, P.R. Mallory, and Sharon Steel. The plant is in operation at a small percent of capacity. "I am convinced that 1958 was the low year in the titanium market," comments Bierwirth. "Aluminum and magnesium both went through similar shakedown periods. We'll be ready when the market picks up."

Elusive Sebacic Acid

Still another process containing metallic sodium was in N-D's bag of tricks. This is for making a mixture of sebacic acid (a highly reactive C_{10} straight-chain compound) and its isomers. The pure sebacic is produced in sizeable quantities, used in making nylon, for plasticizers, etc. The process uniquely employs sodium as a "dimerizing agent"—both ends of a chain compound taking on sodium atoms to be easily exchanged in subsequent reactions.

Extensive pilot plant studies showed that N-D's process would produce a low-cost isomer mixture, but not the pure compound. Consequently market development was undertaken, and thousands of samples were supplied interested prospective customers. A full-scale plant was constructed at Tuscola, but for more than a year refused to function as intended. Four-million dollars were poured into the plant in 1958. By the time the operating problems were resolved, the markets for its mixed



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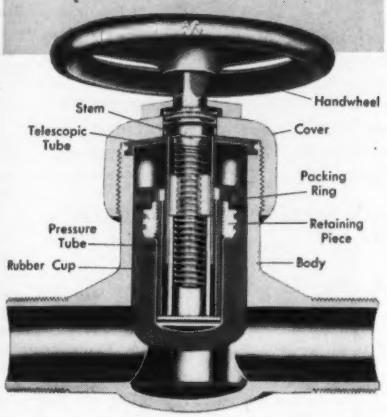

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isomers no longer existed. One in particular, in which the isosebacic was to be an important component for jet lubricants, gave way to adipic acid derivatives, which are available at lower costs.

N-D's patent coverage is basic with regard to the dimerization reaction. There are many benefits to be ultimately gained from this.

In the meantime, experiments are showing process simplifications to be possible that may substantially lower costs of making sebacic acid and a number of dimerization derivatives, some from butadiene. Announcements regarding the use of the plant at Tuscola are expected soon.

Living in a Glass House

Has N-D had undue hard luck in its manufacturing operations? Perhaps, on the other hand, it is quite evident that more has been made known by N-D about their plant affairs than is often the case in the chemical industry. According to Jack Bierwirth, it's his policy of keeping the investing public informed of what happens — good or bad. Has it paid off? The fact that he has been able to get in excess of $100 million in backing for N-D's chemical expansion program (mostly in the form of long-term loans) would indicate that he has the confidence of financial circles.

What's Ahead?

When he recently made Roy F. Coppedge Jr. president of N-D, Bierwirth, now board chairman, put into a key position a young, energetic man who has a 20-year background of N-D affairs, both as legal counsel and executive v-p. Bierwirth has also created a four-man chemical executive committee made up of, besides himself, Coppedge, Hulse, and Marsh.

Hulse recently transferred the Engineering Department from staff status (under his direction) to line status under v-p production, Bob Cornwell. Cornwell has had prepared a new procedure which Hulse recently adopted, which cov-

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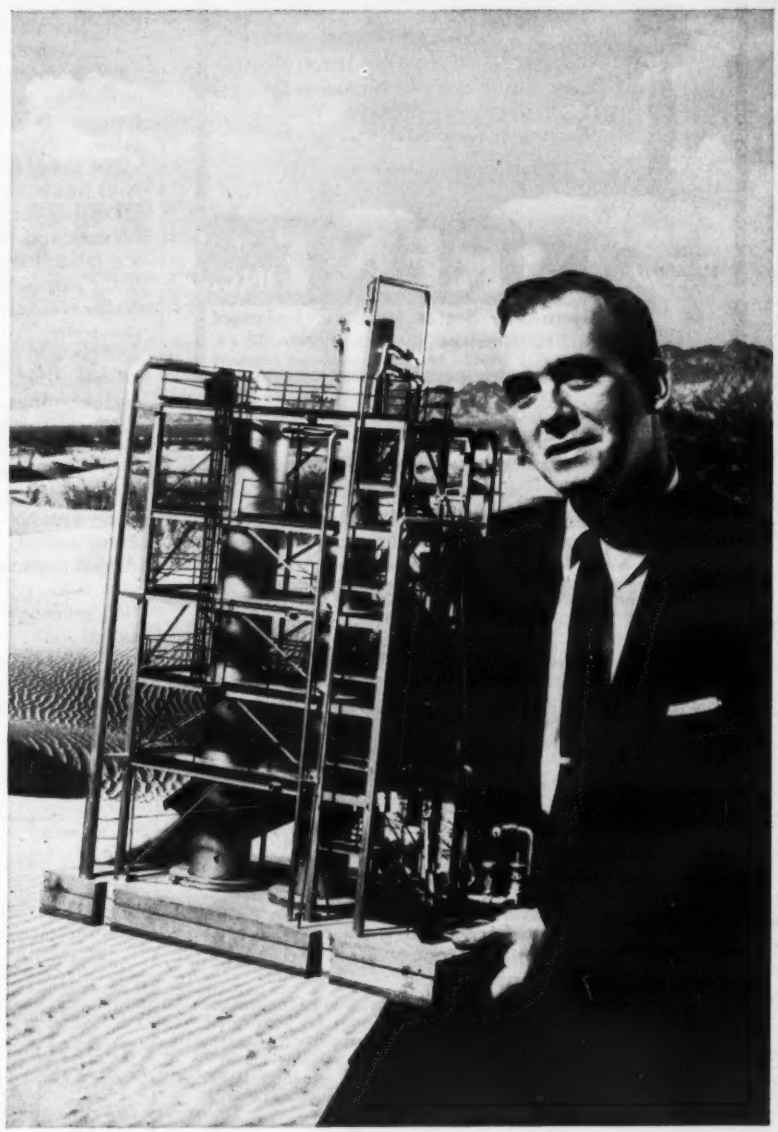
Lectrodryers dry to dewpoints below -110°F.—in volumes of a few cubic feet or thousands per hour. Operation can be fully automatic or manually controlled. Quite likely, there are standard units to suit your needs, or we can recommend special equipment. For this help, write Pittsburgh Lectrodryer Division, McGraw-Edison Company, 352 32nd St., Pittsburgh 30, Pa.



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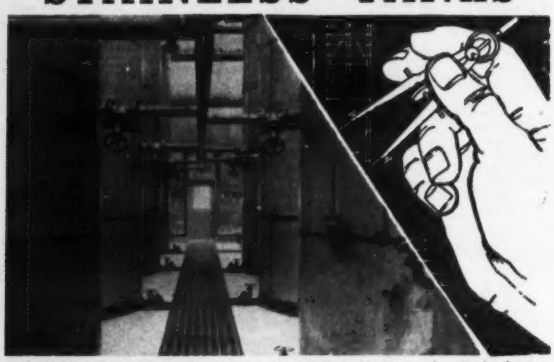

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National Distillers

From preceding page

ers the exchange of information on all projects once they leave Research, and until they become a satisfactory plant facility or are otherwise disposed of.

The USI Sales Department, now under v-p sales Alden Ludlow, has recently been reorganized, primarily to transfer from staff to line the function of field office operation. This is now under George Stanton. Warren Johnson's long and energetic services in USI chemical sales management have been rewarded by his promotion to director, chemical sales. Vince McCarthy is director, plastics sales.

An international division of N-D has been established with offices located near Zurich, Switzerland. A customer service laboratory, to be outfitted with European equipment, is under construction at the same site.

With the year 1959 bringing all-time highs in sales, profits and earnings, N-D faces the future stronger than ever. A definite possibility is entry into copolymers and polypropylene. A breakthrough in new organic chemicals from dimerization seems imminent. Added capacity in agricultural chemicals will parallel continued market development. National looks to the future with the confidence that a ten-year-old can still look forward to a good deal more growth.

"Go right in, he's expecting you."

CONTROLLED POURING

OF
ACIDS
CAUSTICS
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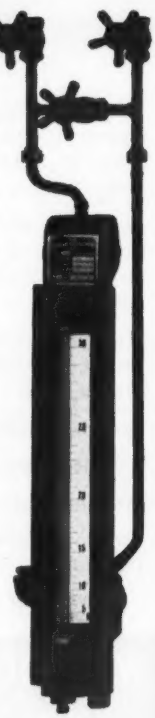
with the Model CP-1 Sterling Hydraulic Drum Lift. Be assured of self-locking and absolute control at any pouring angle.

Lifting capacity 750 lbs. Lifting height 72". For complete details and specification on the CP-1 model and other model Sterling Hydraulic Drum Lifts, write: Dept. CP-12.

STERLING, FLEISCHMAN COMPANY
P. O. BOX 94 BROOMALL, PA.

Check 2603 opposite last page.

LONG-TERM ACCURACY IN A LOW-COST FLOWMETER?
MERIAM HAS IT!



Long-term accuracy is part and parcel of a Meriam Flowmeter. For a Meriam Flowmeter operates on the inherently accurate manometric principle.

It's also a simple device: no pressure-tight bearings, no magnetic followers, no calibration problems.

With the orifice installed in the pipeline, the flowmeter can be located at almost any convenient reading location.

The Type H Flowmeter, shown here, is a rugged, all-steel instrument that will handle pressures to 250 psig, differentials to 160" water. It has no moving parts, is easy to install, requires little maintenance. Other models share these virtues, too; the largest are made for pressures to 1000 psig, differentials to 800" water. Request Bulletin 18-A.

The MERIAM Instrument Company
10920 Madison Avenue, Cleveland 2, Ohio

S.A. 1961

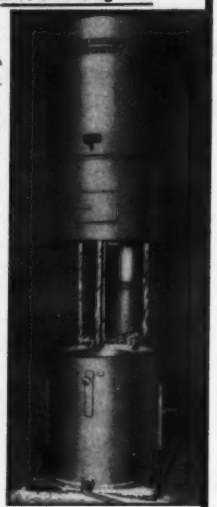
Check 2604 opposite last page.

FOR PROPELLANT— OR PLASTISOL*

ROSS DOUBLE PLANETARY

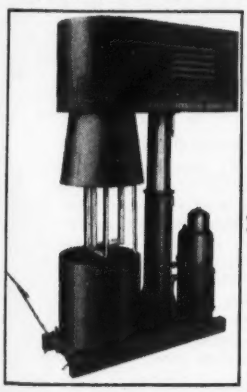
Change Can Mixers give better mixing in less time!

At *Thiokol*® solid propellant plant in Elkton, Md., this Ross #130CDM variable speed 100 gallon Mixer produces the **same high quality mix as obtained in Horizontal Double Arm Kneaders, and in ⅓ the mixing time.**



With no bearings or stuffing boxes in the product zone, stationary can, completely enclosed mix, and remotely controlled raising and lowering device, the Mixers are as safe in operation as they are efficient. Mixers have low original and maintenance cost, are easy to clean, and extremely versatile in operation.

Lower illustration shows an 85 gallon #130-CDM Double Planetary Change Can Mixer furnished a leading concern for mixing plastisols of several types ranging up to 200,000 centipoises. Customer reports Mixer in operation 24 hours/day with mixing time per batch only 15-20 minutes; while the quality of mix and dispersion is so high that the final product is obtained in the Mixer alone — without further processing through a Three Roll Mill as was previously necessary with other Mixers.



Jacketed cans for heating or cooling material during mixing, dolly trucks, gates on cans for discharge, and vacuum tight covers can be provided.

*—or any other heavy paste material. On paints, inks, pharmaceutical products, caulking compounds, and other similar materials, the Ross Double Planetary Change Can Mixers mix and disperse up to 30 times faster than other Mixers.

Mixers available in 1, 2, 3, 4, 6, 8, 12, 20, 25, 65, 85, 125 and 150 gallon sizes. *Write* for complete information on these or other types of Ross mixing, grinding or dispersing equipment!

CHAS. ROSS & SON CO., INC.

Leading mfgrs. of *wet or dry grinding Mills, Kneaders and Mixers* of all types — since 1869.
154 CLASSON AVE., BROOKLYN 5, N. Y.

Check 2605 opposite last page.

Chem Show Preview

The following information, concerning exhibits of new or newly modified equipment and materials scheduled for display at this year's Chem Show, was received too late for inclusion in our November Chem Show Preview:

Storage containers — Pressed Steel Tank Company — are for shipping and storing products incorporated in high-energy fuels.

Impactor mill — Sturtevant Mill Company — is high-capacity abrasives-grinding type.

Centrifugal — The Western States Machine Company — is link-suspended, stationary curb model.

Chemical pump — Dean Brothers Pumps Inc. — is available in 14 different alloys.

Type G globe valve — National Carbon Company, Division of Union Carbide Corporation — and modular entrainment separator are both made of impervious graphite.

Variable laboratory stirrer — General Laboratory Supply Company — is supplied with induction motor made with mechanical stepless variable-speed transmission from 10 to 2250 rpm.

Centrifuges — Chemical Machinery Division, Baker Perkins Inc. — of multi-stage push, 20″ vertical push, and 40″ universal high-output types will be featured along with 10″ universal centrifugal, 20-gal vertical mixer, and mixer incorporating refinements of special heating and cooling system and radial pelletizer.

Flomix models — Nettco Corporation — in ½″ laboratory size and 1″ size for pilot-plant application will be introduced. Sharing spotlight — medium-speed portable mixer.

Vibration-type products — Southwestern Engineering Company — may be seen, including mills, screen separators and feeders.

Centrifugal — Bird Machine Company — of continuous type has 6″ solid bowl and operates at speeds to 6000 rpm.

Filtration-equipment line — Croll-Reynolds Engineering Company, Inc. — has been redesigned extensively.

Pumping unit — The Aldrich Pump Company — is 100,000-psi hydro-pneumatic type.

Package-grinding-plant representation — Allis-Chalmers Manufacturing Company — with full-size operating vibrating ball mill, will be on display along with oil-immersed controller, acid-pump open motor, vertical short-coupled

HOW THE SPERRY FILTER PRESS HELPS YOU MEET THE CHALLENGE OF TOMORROW

Sperry Filter Presses can be made with new glass-reinforced Polyester plates and frames.

Tomorrow *always* comes . . . and with it comes new demands for faster production cycles . . . greater filtering capacity . . . and sometimes increased filtering pressure.

Today's plate and frame Sperry Filter Press helps you meet this challenge—now and in the future.

Sperry Filter Presses are simple, versatile in design—*adaptable to most changing conditions*—yet custom engineered to do a consistent day-in, day-out job of meeting your current schedule most efficiently and economically.

The flexible Sperry Filter Press can handle most filterable mixtures and most filter media . . . with center, side or corner feed; open or closed delivery; high or low temperature control; and your choice of labor-saving devices, including hydraulic closing devices and plate shifting equipment.

FREE SPERRY CATALOG

The outstanding performance of low-cost Sperry Filtration merits your further investigation. Write today for your free copy of the complete Sperry Catalog, including detailed information of Sperry's Plate-Shifters, Closing Devices and other Labor-Saving Accessories.

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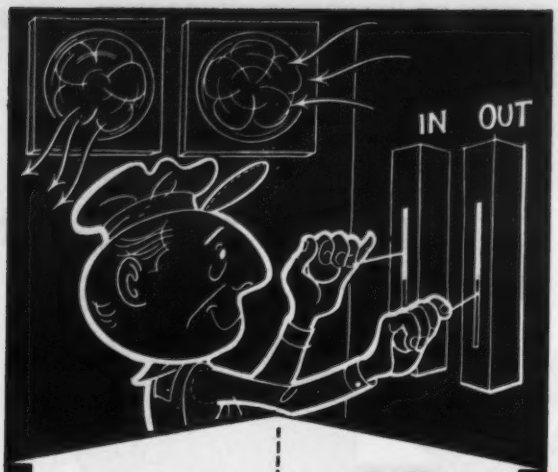

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to provide reversible air movement at the flick of a switch. But you can do the same job more efficiently and economically with a Hartzell reversible fan or roof ventilator. Write for details.

HARTZELL PROPELLER FAN CO.
Div. of Castle Hills Corp.
65 Thomas Blvd., Piqua, Ohio — A member of AMCA

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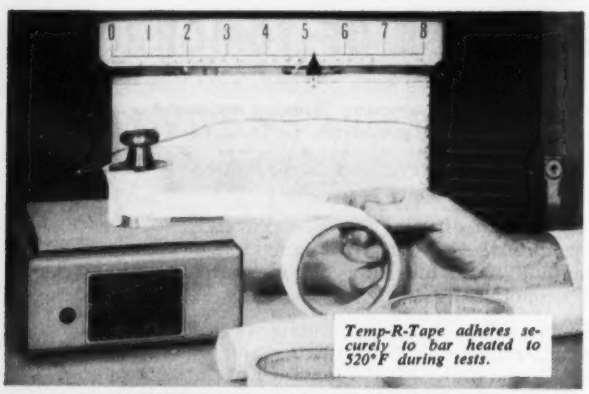

Temp-R-Tape adheres securely to bar heated to 520°F during tests.

CHR PRESSURE-SENSITIVE TEFLON® TAPES

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- *Class H and Class C insulation*
- *Non-stick and low friction facing*
- *Chemical resistant facing*
- *Easy to apply*

Temp-R-Tape is available from stock in rolls and sheets. All four types — Temp-R-Tape T; TH; C and TGV — combine some form of Teflon backing with silicone polymer adhesive to provide easy-to-apply pressure-sensitive and thermal curing pressure-sensitive tapes for electrical and mechanical applications. Designed for extreme temperatures, Temp-R-Tapes possess high dielectric strength, low power factor, high elongation, negligible moisture absorption, are non-corrosive and non-contaminating.

FREE SAMPLES and folder — write, phone or use inquiry service.

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Check 2608 opposite last page.

Chem Show Preview

From preceding page

turbine pump, top-mounted oven, solids-handling pump, canned-rotor pump, double-suction single-stage pump, and full body wafer valve.

Chem-O-Feeder — B-I-F Industries, Inc.—and Adjusto-O-Feeder may be seen on display with continuous loss-in-weight feeders for solids and liquids.

Pressure filter — T. Shriver & Company, Inc. — is of enclosed-tank vertical-leaf type.

Colloid mills and homogenizers and disperser-homogenizer — Tri-Homo Corporation.

Bin discharger — Pulva Corporation — reportedly permits almost an unrestricted flow of material from conventional or silo-type bins.

Sifting, screening machinery — Great Western Mfg. Co. — operates on gyratory principle.

Acid-storage facilities — Metalab Equipment Company, Division of Norbute Corporation.

Electric-control-system components — Bailey Meter Company — are all solid state, have complete self-contained packaging, and are −25 to +25v DC throughout.

Experimental combination calciner and cooler — The C. O. Bartlett & Snow Co. — will be on display along with vibrating-screen line.

ARE YOU A CARTOONIST?

If so, you can recognize humorous incidents in chemical processing operations that can be turned into profits for you.

CHEMICAL PROCESSING will pay:

$10 for black ink cartoons (with gag lines) on 8½ x 11" sheets — ready to reproduce — payable on acceptance.

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Great time-savers, at new low cost, HY-BOY "Verti-Lifts" load, unload, store, stack drums in less time and effort. More important—they provide fast, safe front or side tilting mechanism for efficient "last-drop" emptying. Electro-Hydraulically operated, with heavy duty battery, built-in charger, capacity, 1500 lbs., available in models for lifts from 60" to 112".

Write for HY-BOY Catalog CM-558 and prices on new Drum Handling HY-BOY Verti-Lift Portable Elevators.

WEST BEND EQUIPMENT CORP.
MATERIALS HANDLING ENGINEERS
322 Water Street, West Bend, Wisconsin

Check 2609 opposite last page.

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Faster Warm-Up
Greater Capacity

THE EXCLUSIVE DUAL VALVE* does it. The large main orifice and valve, opened by the pilot valve by a balanced valve principle, permits instant discharge of large quantities of air and condensate. This produces faster warm-up and tremendously increases capacity. All working parts are stainless steel to minimize wear.

ORDER BY PIPE SIZE Each pipe size (½" through 2") automatically handles a complete range of pressures from 0 to 250 PSI without orifice, valve or bucket changes.

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Check 2610 opposite last page.

recent books

reviews of current technical and reference work ... summarized for you by authorities in the field with the CP staff

Thermodynamics

Reviewed by
C. K. Liu
Associate Professor of Mechanical Engineering University of Alabama

Authors J. G. Aston and J. J. Fritz, in a concise and lucid manner, treat theory of thermodynamics in the first half of 556-page book.

Second half of book surveys advances in methods for calculating thermodynamic properties through use of statistical mechanics. The material compiled in this part of book probably can be found in the literature and various other texts on the subject. But this integrated presentation is itself a major contribution to the field of statistical thermodynamics.

To obtain "Thermodynamics and Statistical Thermodynamics," remit $8.25 direct to John Wiley and Sons, Inc., 440 Fourth Ave., N.Y. 16, N.Y.

Check 2611 opposite last page.

Organic Sequestering Agents

Reviewed by
D. S. Davis
University of Alabama

With courage, Stanley Chaberek of The Dow Chemical Company and Arthur E. Martell of Clark University have undertaken a complete and detailed discussion of synthetic amino acids as commercial sequestering agents in agriculture, chemistry and biology, and have interpreted the significant behavior of these compounds in a 616-page volume that is 1) uniquely authoritative and 2) available long before anyone could reasonably expect it.

Proceeding from a consideration of general concepts, the authors delve into properties and formulas of chelates, discuss stabilities of metal chelate compounds, and carry the reader into metal buffers, metal titrations, commercial applications of chelating agents, and the place of metal chelates in biological systems.

The book is not for the beginner; it is, rather, a thoughtful, critical distillation of cogent essences of more than 1000 recent publications, many of which are not readily available to all workers in the field.

The appendixes contain a wealth of information. Author and subject indexes are generous.

To obtain "Organic Sequestering Agents," remit $25.00 direct to John Wiley and Sons, Inc. 440 Fourth Ave., New York 16, N. Y.

Check 2612 opposite last page.

Cellulose & Starch Chemistry

Reviewed by
D. S. Davis
University of Alabama

Edited by J. Honeyman and printed in England, this advanced, well-documented, 358-page reference book summarizes research on starch and cellulose in a competent manner. Line cuts, photographs, and structural formulas are excellent. It's intended for carbohydrate chemists and biochemists and for research people in the paper and textile industries.

To obtain "Recent Advances in the Chemistry of Cellulose and Starch," remit $9.25 direct to Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y.

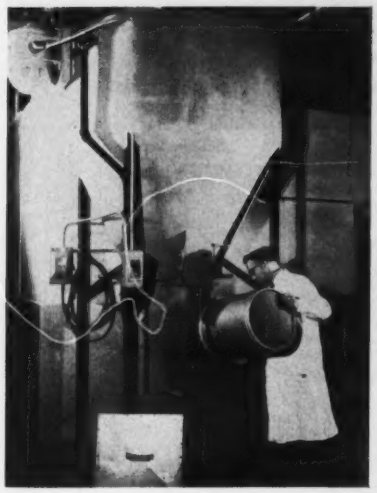
Check 2613 opposite last page.

SPROUT-WALDRON SW Pointers

for Mixing and Blending • Size Reduction • Pelleting and Densifying • Size Classification • Bulk Materials Handling

Published in the interest of better processing by Sprout, Waldron & Co., Inc., Muncy, Pa.

POLYCARBONATE RESIN BLENDED IN STAINLESS STEEL MIXER



Stainless steel jacketed vertical mixer being fed through table high hopper at General Electric Company's Chemical Development Department in Pittsfield, Massachusetts.

Uniform blending of polycarbonate resin at the General Electric Company's Chemical Development Department plant in Pittsfield, Mass., is being accomplished in a special stainless steel 50 cubic foot vertical mixer. The 10′ 10⅜″ high, 60″ diameter vertical mixer is jacketed for 14.7 psig steam pressure.

The product to be blended is trade named, "Lexan." It is a special polycarbonate resin molding compound developed by the General Electric Company to provide unusual toughness and heat stability. The mixer's job is to blend this resin while in ⅛″ chopped rod pellet form just prior to packaging.

In designing the mixer, four major problems had to be overcome. The material had to be kept warm during processing; floor space was at a premium; excessive attrition had to be avoided; and it was desired to feed the mixer from the ground floor.

The use of a steam jacket on the mixer solved the problem of keeping the material warm during processing. The selection of the Sprout-Waldron vertical mixer design took care of the floor space requirements. This 50 cubic foot capacity mixer, including the table height loading unit requires less than 15 square feet of space.

Tests were conducted to find the optimum motor speed to assure thorough blending with a minimum of attrition . . . and ground floor feeding was achieved by the design of the mixer which receives its support from four vertical legs attached to the sides of the cylinder. The hopper is centered just about table top level for convenient feeding. The forced feed-in screw and elevating section below the mixing cone offers maximum efficiency.

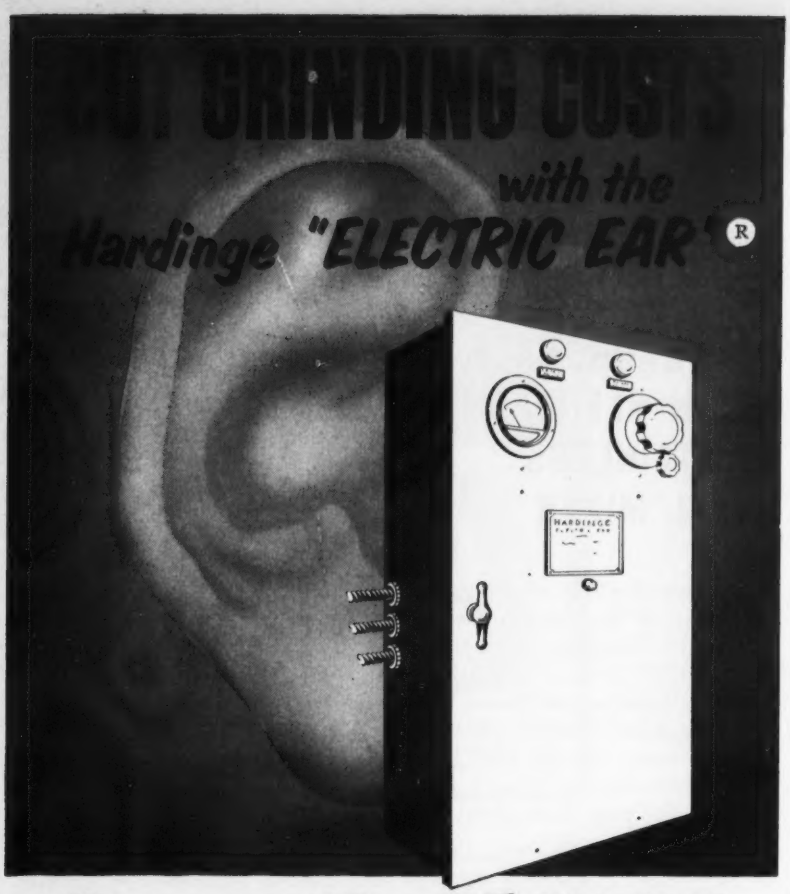
For more information, write for Bulletin 192.

COP/103

PRACTICAL PNEUMATIC CONVEYOR DESIGN

A technical article by the Chief Engineer of our Materials Handling Division. It tells how to select, operate and maintain pneumatic systems for transporting dry, bulk materials. Positive, negative and combination systems are illustrated and described. Ask for Bulletin I-28.

Check 2614 opposite last page.



Users report 10 to 15% INCREASE in their GRINDING MILL CAPACITY

In a recent survey of Hardinge "Electric Ear" users, many of them reported 10% to 15% increased grinding mill capacity after installing an "Electric Ear." This unit controls the mill feed, based upon grinding sound level, to produce optimum grinding conditions.

Here are a few typical statements from satisfied customers:

"This unit is doing a remarkable job. It reduces steel and liner consumption. We estimate a savings, with our two units, of $6000 per year on grinding balls and liners. Capacity gained 10%."

"Approximately 25% gain in capacity."

"Helps prevent plug-ups."

"Maintains uniform mill load. Estimated gain in capacity 10%."

"We feel this unit is essential to our operation from a proper quality control standpoint. We would not be able to keep up our present rate of accelerated production and quality without it."

"'Electric Ear' is helpful when inexperienced grinders are learning to operate the mills."

"Eliminates human element in mill feed level."

"Saving per year—$10,000.00."

"Principal reason for 'Electric Ear' use is that it aids the operator, and the mill can be operated from a remote panel."

Write for Hardinge Catalog No. 42A-13.

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Check 2615 opposite last page.

The Sequestration of Metals

Reviewed by
ANDREW J. SNYDER
University of Alabama

As the field of interest and knowledge increases in some particular subject, eventually a book will result. In line with this trend is Robert L. Smith's 256-page text, "The Sequestration of Metals: Theoretical Considerations and Practical Applications."

Smith's book, a pioneer in this rapidly advancing field of chemistry, is divided into ten chapters. The short Chapter I is devoted to the author's definition of sequestration. The next several chapters deal with theoretical considerations and with chemical and physical properties of reagents used.

About one-half of the book is devoted to practical use of sequestering agents, first from general principles. Chapters on specific industries and on use of reagents in analytical chemistry and in applied biology follow.

To obtain "The Sequestration of Metals," remit $8.50 direct to The Macmillan Company, 60 Fifth Ave., New York City, N. Y.

Check 2616 opposite last page.

Process Equipment Design

Reviewed by
D. S. DAVIS
University of Alabama

"Process Equipment Design," by Lloyd E. Brownell and Edwin H. Young, is a suitable companion to Brown's "Unit Operations," which it matches in page size, 8x11 inches. This 408-page book should find ready acceptance by all in industry who are charged with designing vessels of all types. Cost and design data that appear in scattered handbooks, codes, industrial bulletins, and technical literature are brought together under one cover and tied in neatly with sound engineering theory and practice.

Among other features, the authors discuss criteria; shells, bottoms and roofs for cylindrical containers; stess considerations; saddle supports; flanges; high-pressure monoblocs; and elliptical, torispherical and hemispherical dished closures. Theirs is a reference book, highly mathematical.

Plots, tables and photographs are all good. Additional tables and graphs appear in the twelve appendixes; substantial author and subject indexes are included.

To obtain "Process Equipment Design," remit $19.50 direct to John Wiley and Sons, Inc., 440 Fourth Ave., New York 16, New York.

Check 2617 opposite last page.

"Symbolic Logic and Intelligent Machines" explains in a practical manner principles, methods and purpose of symbolic logic and Boolean algebra, on which the programming of intelligent machines is based. Comparisons and examples are used to answer basic questions on the symbolic logic.

Design and principles of both small and large machines are included along with specific problems. The role of symbolic logic in the programming of automatic computers and such complex devices as robots completes this book by Edmund C. Berkeley, President, Berkeley Enterprises, Inc.

To obtain "Symbolic Logic and Intelligent Machines" remit $6.50 to Reinhold Publishing Corporation, 430 Park Avenue, New York 22, New York.

Kinetics of high-temperature processes in general, and nonmetal systems in particular, are discussed in a 326-page book. This volume was prepared from material presented at five-day conference held at MIT in June, 1958. The work is a record of current efforts to understand kinetics of high temperature processes and to apply this understanding to frequently complex systems. The book is highly recommended for those interested in high temperature processes.

To obtain "Kinetics of High Temperature Processes" remit $13.50 direct to John Wiley & Sons, Inc. 440 Fourth Ave., New York 16, New York.

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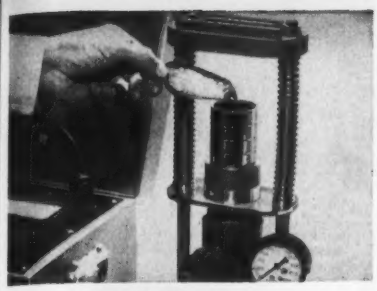

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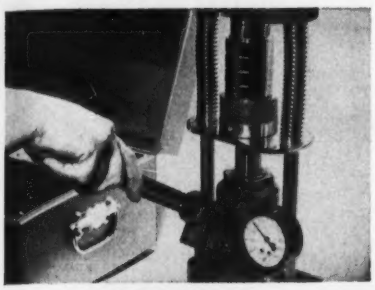

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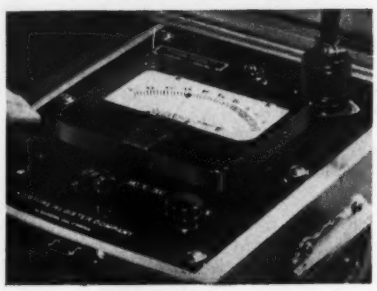

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Write, stating material to be tested, and moisture range, or check No. 2619 on reader service slip.

ELECTRONIC MOISTURE REGISTER Instruments

Moisture Register Co., Dept. CPC
P.O. Box 910, Alhambra, Calif.

Check 2619 opposite last page.

Chemistry of Carbon Compounds

Reviewed by
D. S. Davis
University of Alabama

Heterocyclic Compounds, Volume IV-B of this series edited by E. H. Rodd, consists of eight extremely advanced chapters. These deal with compounds containing a six-member ring with one hetero atom; brazilin and haematoxylin; compounds with two fused heterocyclic rings; the cyanine and related dyes; the indigo group; the pyrole pigments; compounds that contain unusual hetero atoms; and compounds containing a six-member ring with two hetero atoms.

The contributors, Neil Campbell, Robinson, Anderson, Stevens, I.G.M. Campbell, Ramage and Landquist, follow the form of the previous volumes and spare nothing to give the reader an authoritative, complete, and up-to-date treatise. Documentation is thorough, structural formulas are given in profusion, and an exceptionally generous subject index is provided.

To obtain "Chemistry of Carbon Compounds, Vol. IV-B," remit $24.00 direct to D. Van Nostrand Company, Inc., 257 Fourth Ave., New York 10, New York.

Check 2620 opposite last page.

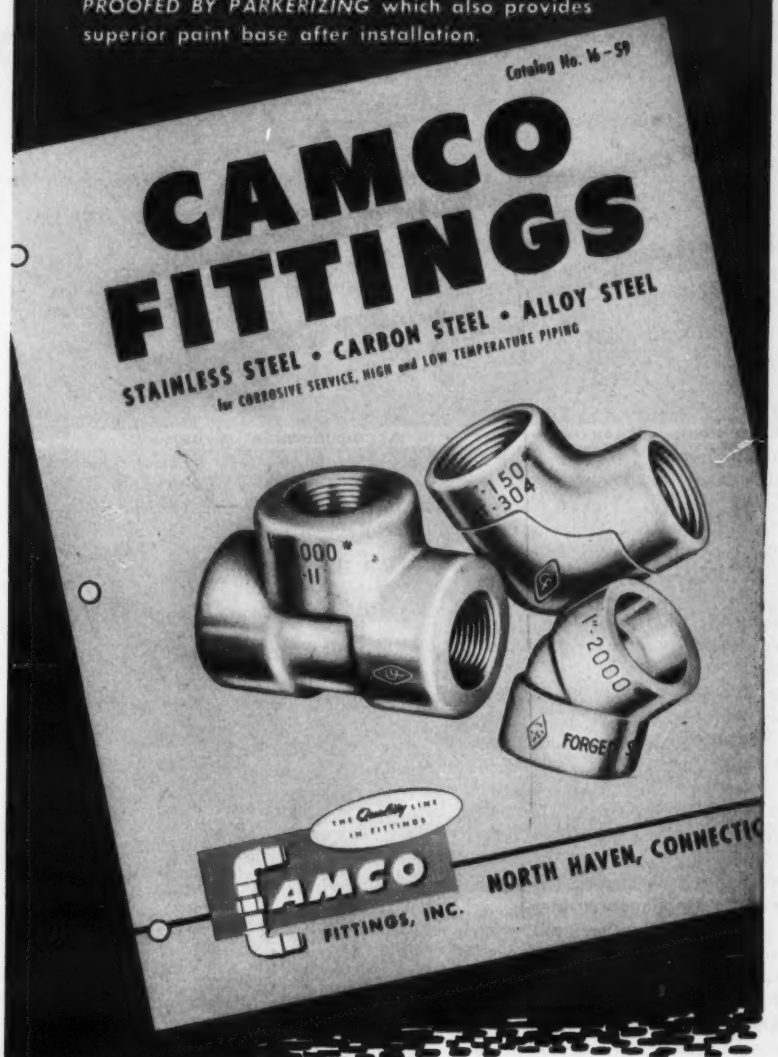
Recent developments in plastics, including their properties, production, price, application and selection, are concisely treated in 354-page illustrated book. Significant recent improvements in established plastics and the 100 most important patents issued in the plastics field for 1958 are included together with a section on graft copolymers.

This book concerns itself almost exclusively with the latest developments and contains the first survey of federal-sponsored research in plastics. Practical volume by Herbert R. Simonds, Consulting Engineer, gives complete information about polypropylene and polycarbonate.

To obtain "Source Book of the New Plastics" remit $10 direct to Reinhold Publishing Corporation, 430 Park Ave., N.Y. 22, N.Y.

now available...

FORGED STEEL screwed and socketweld pipe fittings (2000# thru 6000# rating) with all surfaces *RUST PROOFED BY PARKERIZING* which also provides superior paint base after installation.



A complete line of *STAINLESS STEEL* fittings in all pressure ratings from 150# thru 6000#.

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North Haven, Connecticut

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Check 2621 opposite last page.

Aluminum jacketing on steam lines saves ⅓ installation cost per year

Prevents deterioration of canvas-covered insulation from sun and weather, also makes plant much more attractive

GORDON WEYERMULLER, Associate Editor

Problem: Canvas-covered insulation on outside steam and condensate lines of the Eli Lilly and Company Lafayette plant was requiring major repairs every two years. Three 950′-long lines were involved, including two 12″-diameter 400-lb steam lines and a 4″-diameter condensate return line. Lines go from power house to manufacturing area.

Solution: Corrugated aluminum jacketing with Lap-Seal was installed on the two 950′ steam lines and the 950′ condensate line in 1958. Jacketing was also installed on water lines, a benzol line, and other miscellaneous lines.

Jacketing is designed with a series of eight circumferential ribs rolled into underlapping edge. Proper lap is assured without waste. A mastic can be used for a positive weather seal. A factory-attached 30-90-30 duplex asphalt-laminated moisture barrier on underneath side of aluminum provides corrosion protection. Cross-crimping increases longitudinal rigidity of the aluminum and adds to its appearance. Jacketing can be installed with a minimum of labor.

Results: Installation of aluminum jacketing, which costs about the same as repairing the canvas covering, is saving over one-third the installed costs per year. Since jacketing is expected to last about 10 years, it will result in a considerable savings in maintenance costs over that period. In addition, aluminum jacketing improves the overall appearance of the plant.

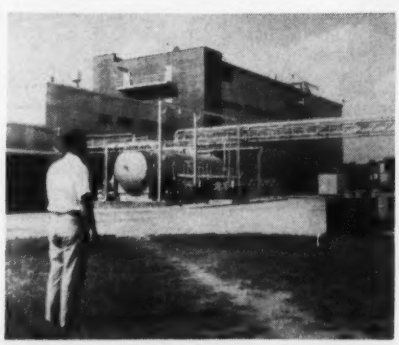
(Aluminum jacketing is product of Childers Mfg. Co., 3620 W. 11th St., Houston, Texas.)

Check 2622 opposite last page.

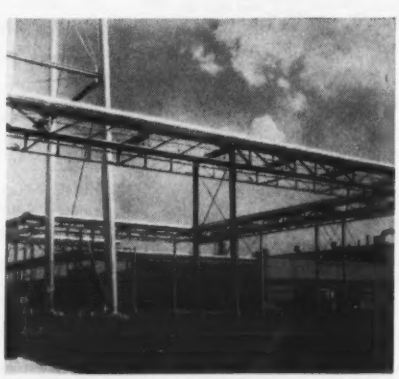
Aluminum jacketed lines, which lead to chemical area in background

Three 950′ lines protected with aluminum jacketing coming from power house in rear to manufacturing area

Photos by CP Staff

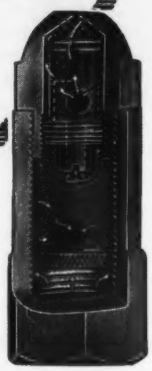


Aluminum jacketing enhances appearances of main chemical operation building



Aluminum-jacketed lines in front of warehouse

There's a *Monarch* nozzle for every spray job!



If the liquid can be sprayed with direct-pressure rely on MONARCH advanced-design NOZZLES

Many industries make MONARCH Spray NOZZLES standard equipment. Monarch's advanced design reduces clogging and guarantees dependable applications to . . . .

★ ACID CHAMBERS
★ AIR WASHING
★ CHEMICAL PROCESSING
★ COOLING PONDS
★ DESUPERHEATING
★ GAS SCRUBBING
★ HUMIDIFYING
★ OIL BURNERS
★ SPRAY DRYING

Send for Catalog !

Monarch
MFG. WORKS, INC.
3403 GAUL STREET
PHILADELPHIA 34, PA.

Check 2623 opposite last page.

Chemical Boobytraps

Unsuspected hazards awaiting the unwary

Toxic fumes can kill hours after exposure

Leakage of toxic fumes or irritants is one of the asphyxia hazards in a chemical plant. Certain fumes, such as oxides of nitrogen can produce fatal pulmonary edema several hours after exposure. The afflicted person, however, may not be aware of discomfort until edema has already begun. (In pulmonary edema, fluid leaves blood capillaries and enters lung air cells, actually drowning patient.)

Even mild electric shock, usually shrugged off by a healthy person, can paralyze respiratory centers. This can easily kill a person with cardiac condition.

In addition to these causes of pulmonary edema, there are a number not directly related to the job—cardiac condition, high blood pressure, circulatory ailments, asthma and emphysema. These can be easily aggravated by on-the-job conditions.

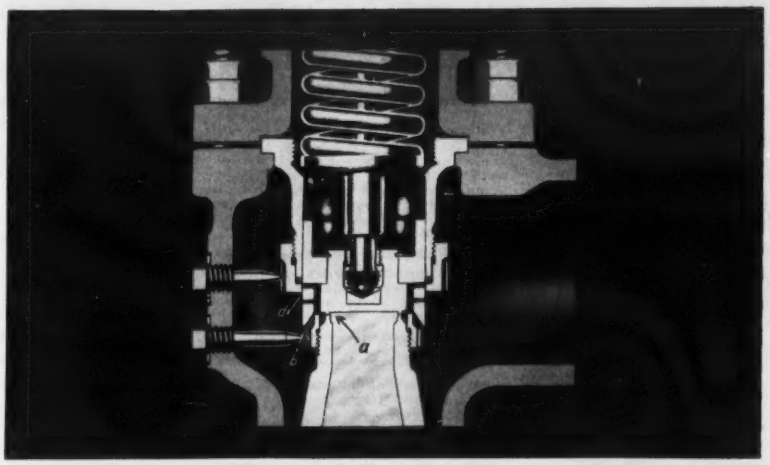
In critical asphyxia, breathing stops completely. Vital centers of the victim's body rapidly become deprived of the oxygen needed. Any delay in treatment may result in death. Approximately eight minutes of total oxygen deprivation will cause permanent damage to the central nervous system.

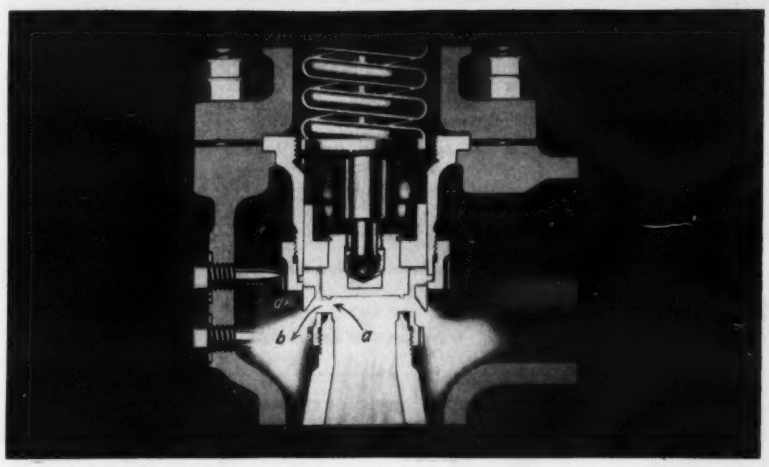
(Contributed by William E. Doering, Medical Equipment Research Supervisor, National Cylinder Gas, Division of Chemetron Corp., 840 N. Michigan Ave., Chicago, Ill.)

Portable fire extinguishers, wheeled units, built-in carbon-dioxide extinguishing systems, and several types of fire-detection devices are outlined in 16-page Booklet P-49—Walter Kidde & Company, Inc., Main Street, Belleville 9, N. J.

Check 2624 opposite last page.

Look into Lonergan Valves





Top: Valve closed, ready to pop. Pressure confined within throat chamber. Bottom: Open. Full (D/4) lift obtained at standard over-pressure. Orifices (a) and (b) full open, port (d) sealed off. Full pressure on baffle area.

Here's the valve that sets the industry standard for reliability, safety and economy.

Lonergan V and W series valves are designed to provide full power at the *end of lift* when opening. This means full lift, thus maximum capacity flow at a low accumulation.

Through the control principle shown here, Lonergan valves close cleanly, without shock and can be adjusted to the application requirements for either vessel or line, on blowdown.

The opening point of Lonergan valves is consistent. Capacity is assured. In addition, the non-shock closing eliminates damage to the seats, thus reducing maintenance and product loss due to seat leakage.

Full details on the Lonergan V and W series of valves for process industries are given in catalogs 900-V and 1000-V. Write for your copies today.

Lonergan
J. E. LONERGAN CO., 203 RACE STREET
PHILADELPHIA 6, PA. SINCE 1872

Check 2625 opposite last page.

For chemical plant uses, on all studs and bolts exposed to temperatures up to 1800° F. such as on compressor head assemblies, hot pump studs, autoclaves, reactor flange studs, heaters, heat exchangers, "cat" crackers, stainless steel assembly.

Try C-5 and see why leading refineries, manufacturers and power producers have made it part of their regular preventative maintenance program.

- ✓ Ends Seizing and Galling even up to 1800°F.
- ✓ Reduces Wrench Torque
- ✓ Ends Stud Breakage
- ✓ Permits Repeated Re-use
- ✓ Speeds Assembly and Disassembly
- ✓ Protects Stainless Steel at all Temperatures

ANTI-SEIZE THREAD COMPOUND

C-5's exclusive colloidal copper formula separates mating metal threads and surfaces with cushioning, protective copper plating. C-5 prevents galvanic action and eliminates pitting even when dissimilar metals join. On mating metal surfaces, C-5 saves gaskets and countless man hours.

WRITE TODAY . . . For Your FREE Test Sample Can of C-5.

FELT PRODUCTS MFG. CO.
Dept. 34, P. O. Box 8609
Chicago 80, Ill.

Check 2626 opposite last page.

SPRAY NOZZLES

greater choice of patterns

Full Cone
Hollow Cone
Square Spray
Flat Spray

greater choice of capacities

greater choice of materials and spray nozzle types

Whirljet hollow cone spray

Fulljet full cone spray

Pneumatic Atomizing Nozzle

Flatjet flat spray

Over 12,000 Standard Spray Nozzles
for more exact performance
to fit your needs

For complete information write for Catalog No. 24

SPRAYING SYSTEMS CO.
3216 Randolph Street • Bellwood, Illinois

Check 2627 opposite last page.

ENGINEERING & SAFETY

Single pressure setting for unloading and max in two-volume pump

Uses: Two-volume pumping applications.

Features: Pump requires only single pressure setting for both unloading and maximum pressure.

Description: Two-volume pump prevents excessive heat generation and wasted horsepower by automatically maintaining system pressure with small-volume pump, while fixed differential between relief-valve setting and unloading valve allows return of large-volume pump capacity to reservoir at negligible pressure.

Pumps are recommended for 1000 psi at 1200 rpm in small-volume operation, and to 750 psi at 1200 rpm in larger-volume operation. Two pump groups are provided—one with 18 combinations of small-pump cartridges with capacities, at operating pressure, of 4 to 21.4 gpm for large volume operation. Second has 30 combinations of small- and large-pump cartridges with capacities, at operating pressure, of 14.7 to 45.2 gpm, for large-volume operation. Choice of either foot or flange mountings are available.

(Two-volume pumps are product of Vickers Incorporated, Division of Sperry Rand Corp., Detroit 32, Mich.)

Check 2628 opposite last page.

WANTED:

To Keep You Alive

Almost everyone knows of some tricky unexpected danger situation in his plant. CHEMICAL PROCESSING feels that the dissemination of such information to readers is important. Therefore a monthly series on Chemical Boobytraps is now appearing in this section. If you know of any such situation, please forward an account of it to:

Safety Editor
CHEMICAL PROCESSING
111 E. Delaware Place
Chicago 11, Illinois

the finest COATED FABRIC WORK GLOVE in the world

SURETY SILVERTEX

To handle those hot, tough jobs nothing equals Surety Silvertex Gloves for longer wear and lower cost. Superior Silvertex coating reflects heat and affords better protection against most industrial chemicals than rubber and standard synthetics. Their curved finger design and wing thumb construction cuts wear and gives greater comfort. And they won't crack or peel—remaining soft and pliable for the life of the glove.

Available in gauntlet, knit wrist, band top and safety cuff styles, all in jumbo sizes and with or without ventilated backs. For a free test pair write on your letterhead, outlining your job requirements. We'll send them to you by return mail.

THE SURETY RUBBER COMPANY
CARROLLTON, OHIO

In Canada: Safety Supply Co., Toronto

Check 2629 opposite last page.

Conveying Corrosive Chemicals?

SOLVE THEM WITH
Aeroquip Flexible Hose of Teflon
and Reusable "*super gem*" Fittings*

Chemicals, solvents and other fluids which deteriorate ordinary hose or tubing can be handled safely with Aeroquip 2802 Hose of Teflon. It is chemically inert and stable, has excellent lubricity, withstands temperatures from -65°F. to 500°F. Long, trouble-free performance, even under constant hose line flexing is assured. Corrosion-resistant "*super-gem*" Fittings are reusable. Call your Aeroquip Distributor, or write for IEB-40 for details.

*U.S. Patent Nos. 2,833,567 and 2,731,279.
"*super gem*" is an Aeroquip Trademark
Teflon is DuPont's trade name for its tetrafluoroethylene resin

Aeroquip

AEROQUIP CORPORATION, JACKSON, MICHIGAN
INDUSTRIAL DIVISION, VAN WERT, OHIO. WESTERN DIVISION, BURBANK, CALIFORNIA
AEROQUIP (CANADA) LTD., TORONTO 18, ONTARIO

Check 2630 opposite last page.

PROBLEMS?

Interested in solving them? Want to learn new ways of improving your plant operation and, thereby, realize savings?

In each . . .

issue of CHEMICAL PROCESSING there are articles that will help you solve many of your operational problems.

These "New Solution" stories appear in the "New Solutions" section which begins on page 33 of this issue.

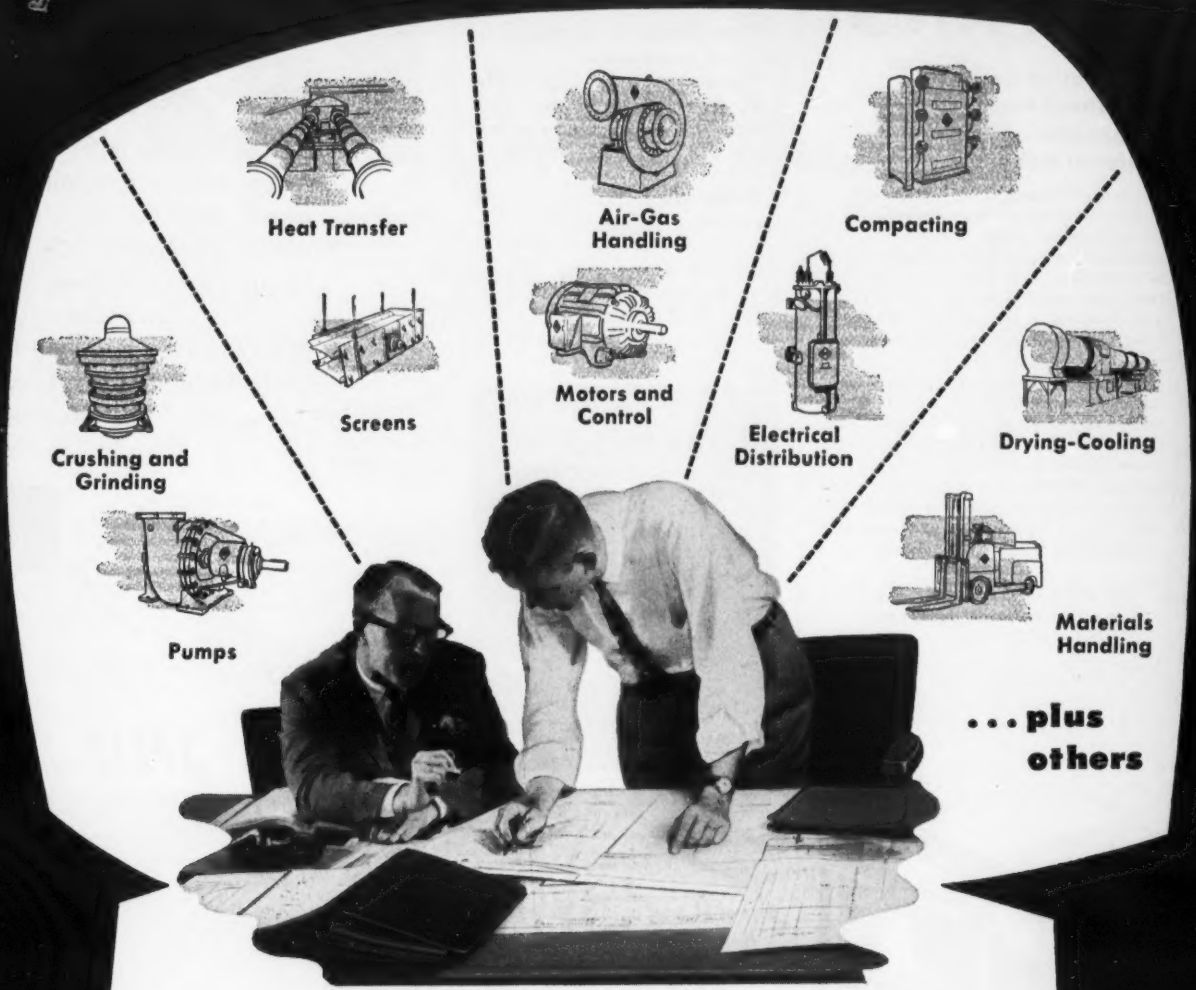
This type of story is featured in other sections throughout the magazine.

They are case history stories that state the operating problem, explain how it was solved, and describe the results obtained.

"New Solution" stories cover all important phases of your operations — processing, safety, maintenance, material handling, packaging, corrosion, to name a few.

For more information on product at right, specify 2631 see information request blank opposite last page.

SCOPE of PRODUCT LINES from . . . **ALLIS-CHALMERS**



ONE man can provide

all this "teamed" equipment

He's your Allis-Chalmers representative. *One inquiry* to him and much of the equipment for any process expansion or modernization is available.

Time and money-saving advantages of this single source are obvious. Further, you're assured of "teamed" equipment, engineered by A-C chemical industry specialists. And, once installed, this equipment continues to be backed by outstanding field service.

ASK "THE MAN" about the tremendous scope of A-C equipment for petro-chemicals . . . equipment that's built for the finest quality control. Or write Allis-Chalmers, Milwaukee 1, Wisconsin.

Products for Petro-Chemicals: *Electrical Generation, Distribution and Utilization Equipment; Pumps (rotary vacuum and centrifugal); Mechanical Power Transmission Equipment; Processing Machinery (mills, kilns, screens, etc.); Water Conditioning Systems, plus Materials Handling Equipment.*

A-C ALLIS-CHALMERS

A-5983.C

Largest Merchant Iron Producer in U. S. Chooses

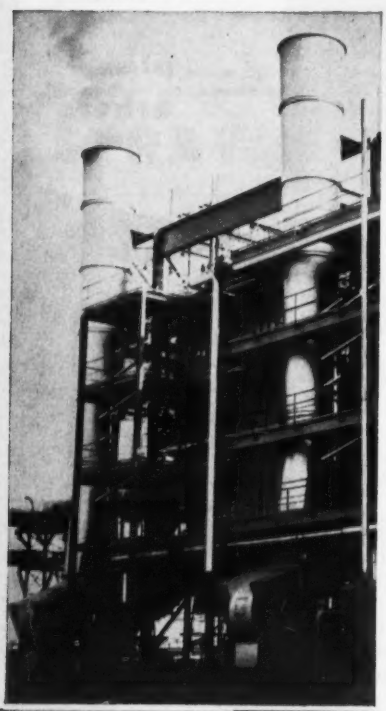
WHIRLEX ID FANS

High Erosion Resistant Fan Wheel Assures Longer Life . . . Minimum Maintenance

The largest furnace in the country producing merchant pig iron was recently placed in service as part of an expansion program by a major Southern mill. The new furnace has a rated capacity of 1000 tons per day and is one of the most modern in the country with respect to mechanization and automatic controls.

Because of their unique design and high erosive resistance, WHIRLEX heavy duty draft fans were chosen to handle the hot blast furnace gas. The three units shown here carry approximately 150,000 cubic feet of gas per minute. Preliminary fan examinations show wear to be less than a third that of ordinary fans designed for this purpose.

A Whirlex fan installation may solve your problem. Write or wire us.



Fly Ash Arrestor Corp.
200 N. 1st Street
BIRMINGHAM, ALA.

WHIRLEX

Check 2632 opposite last page.

ENGINEERING & SAFETY

Free-piston pumping of any material that flows

Uses: Pumping of wide variety of materials.

Features: Pump reportedly will handle anything that flows. It has only nine moving parts. Its chambers are 100% stainless steel.

Description: Air-operated free-piston pump impels continuous air-free flow without pulsating or surging. There are no motors or engines, drive shafts, packings, seals, or oils or greases. No safety or relief valves are necessary. Pump can be operated while submerged.

Air-operated free-piston pump has no motors or engines, drive shafts, packings, seals, or oils or greases

Pump is operated by compressed air which is introduced into each cylinder in sequence. While first cylinder is discharging, center cylinder has filled and is waiting and last cylinder is filling.

Chambers fill by gravity. Nylon free-floating piston and two nylon ball valves are in each chamber. Because one chamber can be stopped while other two continue to function, pump can operate indefinitely without being shut down.

Operation sequence is as follows:

1) Discharging Cylinder— Air under pressure is introduced into cylinder at top of chamber. Air exerts downward pressure on free-

To page 163

Life and limb are at stake . . .

CHOOSE THIS *BETTER* *Emergency Light*

CARPENTER WATCHMASTERS

- ★ BETTER PROTECTION . . . every component of every unit is specially engineered for emergency lighting . . . for reliability
- ★ BETTER PERFORMANCE . . . each part must rate far in excess of even maximum requirements . . . for dependability
- ★ BETTER VALUE . . . built for longer life and less maintenance . . . for lowest cost over the years

THERE IS A CARPENTER WATCHMASTER MODEL FOR EVERY NEED (INCLUDING HAZARDOUS EXPOSURES) AND FOR EVERY BUDGET

CATALOG and TECHNICAL SPECS available for the asking. Write for special Watchmaster material now.

CARPENTER MFG. COMPANY
651 Bradley St.
Somerville 45, Mass.

Check 2633 opposite last page.

SPLIT SECOND SAFETY

IN EMERGENCY . . . contaminated eyes are instantly cleansed of dangerous particles and chemicals by *controlled* water streams from HAWS Emergency Eye-Wash Fountains. This "split second safety" before medical aid arrives can mean the difference between temporary eye irritation and permanent eye injury! HAWS will provide emergency facilities best suited for your safety program—minimizing hazards, reducing claims, lowering insurance costs. Get the facts by writing today for illustrated literature!

HAWS EYE-WASH FOUNTAINS

MODEL 7100
(old model 8930)

Basic eye-wash model with enameled iron bowl, quick opening valve for manual operation, adaptable to treadle operation; chrome plated brass water pressure regulators and twin fountain heads. Wall mounted and pedestal models available.

HAWS

HAWS DRINKING FAUCET CO.
Since 1909
1443 FOURTH STREET
BERKELEY 10, CALIFORNIA

EXPORT DEPARTMENT: 19 Columbus Avenue, San Francisco 11, California, U.S.A.

Check 2634 opposite last page.

THAT'S INTERESTING

Better 'vision' for missiles

A new optical material is expected to enable missiles used for defense to "see" farther and better. Developed by Kodak, the material forms the "windows" through which heat-seeking missile guidance systems home in on their targets. Material is transparent to the infrared radiation that guides a missile to its prey.

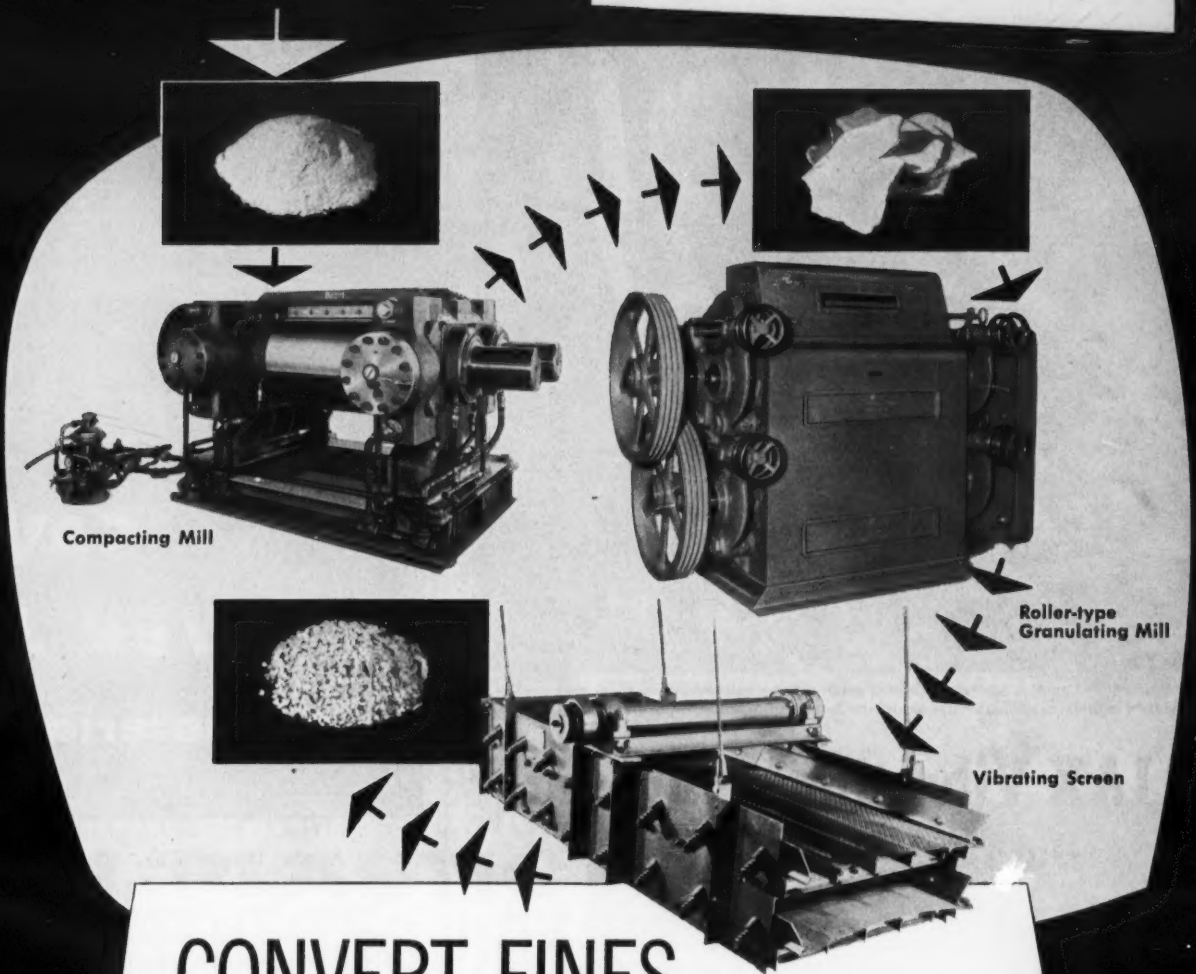
Foreign exchange

Every Fiat 2100 car made in Italy in the 1960 model year will contain 12 pounds of plastic made in America. The windshield and window trim, steering wheel housing and the dashboard are molded from a resin-rubber blend produced by Naugatuck Chemical division of United States Rubber Company.

For more information on product at right, specify 2635 see information request blank opposite last page.

SCOPE in INDUSTRY
SPECIALIZATION from...

ALLIS-CHALMERS



CONVERT FINES

to high-quality granules with a complete processing circuit

The Allis-Chalmers compacting process can turn 80 to 90% of your present waste fines into salable granules . . . often of higher quality than the granules produced in your original process. For example: Tests on products reconstituted by the Allis-Chalmers system have shown compacted granules to have better controlled solubility, more uniform particle size, better "eye-appeal" and freer flow.

Here's how fines are recovered: Waste or fine salts from the original process are fed into a compacting mill. The mill mechanically densifies the fines into flakes. Flakes are then granulated by a roller mill—separated and sized by a vibrating screen.

For more information, get Bulletin 07B8836 from your A-C representative or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin.

A-C ALLIS-CHALMERS

A-1191-C

Photographs shows an Ajax Lo-Veyor installed out of the way below the floor. Floor grids similar to those shown in foreground removed to show arrangement of combination conveyor pan and screen.

AJAX Vibrating Conveyors
Do Two Or More Jobs

for price of one machine

With today's skyrocketing costs, the importance of reducing non-productive expense was never more urgent. Large and small plants are saving money in first cost, processing cost, and maintenance cost with Ajax Lo-Veyors engineered to fit your requirements.

Photograph shows an installation designed to simplify and speed up handling and separating bulk materials flowing from 10 production lines.

Send for latest AJAX SELECTION GUIDE

Learn how Ajax Vibration Engineering Service can help you cut your costs. Phone, write, or send coupon for your copy of this helpful book.

AJAX

AJAX FLEXIBLE COUPLING CO. INC.
24 English St., Westfield, N. Y.
In Canada—The Alexander Fleck, Ltd., Ottawa

Please send Ajax Lo-Veyor Selection Guide to

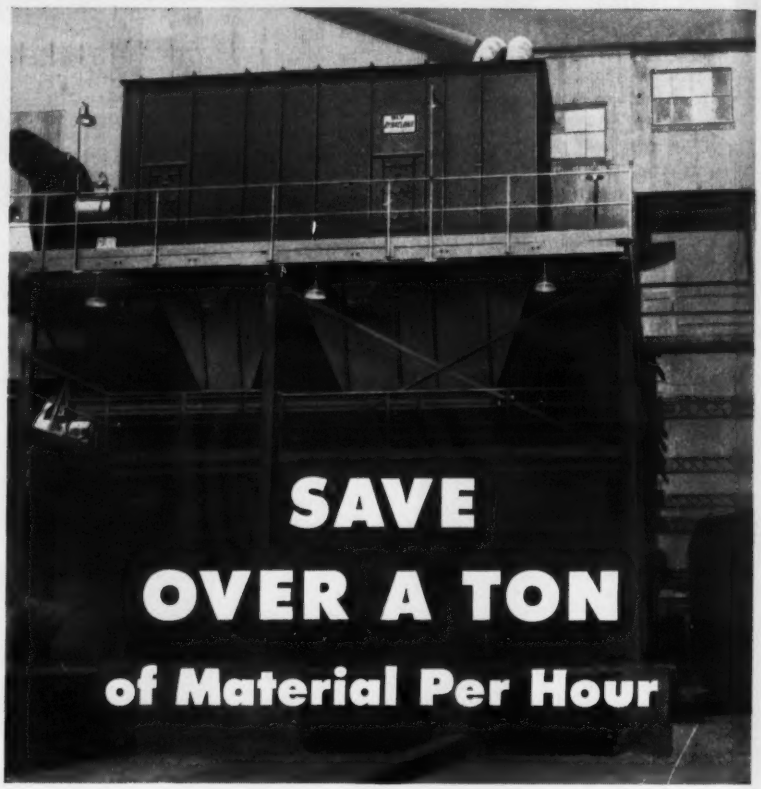
Name_____

Concern_____

Address_____

Check 2636 opposite last page.

SLY DYNACLONES®
at American Potash



At its Trona, Cal., plant, American Potash & Chemical Corporation uses 4 Sly Dynaclone Dust Filters at the Borax Refinery, Borax Shipping Station, Coarse Granular Potash Plant, and Potash Shipping Area (pictured above). During every hour of operation, the Dynaclones recover an estimated 1260 pounds of borax and 1140 pounds of potash.

In addition to these substantial material savings, the Dynaclones are the key to improved health and safety, better housekeeping, more efficient plant operation. Good performance, long bag life and nominal maintenance requirements are noteworthy Dynaclone features.

Put the "Roll-Clean" Dynaclone to work on your continuous processes. Benefit from these advantages: Constant, uniform suction at dust sources, 24 hours a day if required. Automatic bag cleaning. More cloth per cubic foot of filter. New "Resist-O-Wear" filter bags (patent pending) — as much as 3 times longer life.

Get complete Dynaclone details . . .
Send for Catalog 104

SINCE 1874 SLY

THE W. W. SLY MANUFACTURING CO.
4754 TRAIN AVENUE • CLEVELAND 1, OHIO
OFFICES IN PRINCIPAL CITIES
OVERSEAS LICENSEE: ANDREW AIR CONDITIONING LTD., LONDON S.W. 1, ENGLAND

Check 2637 opposite last page.

From page 160

floating piston, closes inlet valve, and opens outlet valve. Ball on lower part of piston seats in outlet on bottom of chamber before all fluid is evacuated, sealing compressed air in cylinder.

2) Waiting Cylinder—Completely filled cylinder receives air charge just before flow from discharging cylinder stops.

3) Filling Cylinder—This cylinder is filled by force of gravity. Power-impelled filling is optional.

Filling and discharge of chambers is automatically actuated by electric control box. Timing of operation is governed by substance to be pumped, air pressure available and sizes of inlets and outlets. Control box may be installed any distance from pump.

Model shown in photo will pump approximately 100 gpm of water. Pump measures 45x 24x53" high. Its weight is approximately 1000 lb.

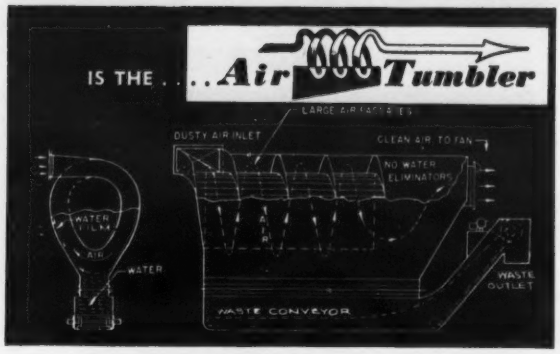
Standard models will have capacity range of 5 to 1000 gpm, or more. A 100-psi air pressure will provide head of water 220' high. Operating air pressures can vary from 10 to 1000 psi, or higher. Low-pressure pump, operated at less than 100 psi, can be disassembled for cleaning and reassembled in about 15 min.

(Free-piston pump is product of The Crossley Machine Co., Inc., Trenton 9, N. J.)

Check 2638 opposite last page.

"Sure, I got your latest recommendation—oh yes, here's part of it."

The MASTER of DUST in INDUSTRY



SIMPLE—DEPENDABLE—NO FIRE HAZARD
HIGH EFFICIENCY—CONSTANT CAPACITY
LOW HUMIDIFICATION—LOW OPERATING COST

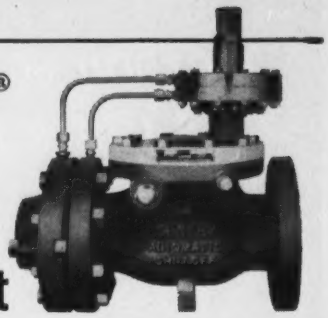
More than one million CFM in ONE plant

Write for Bulletin No. 581. Address

DUST SUPPRESSION & ENGINEERING CO.
P. O. BOX 67 • LAKE ORION, MICHIGAN

Check 2639 opposite last page.

SENTRY® VALVES



stop or start full round flow in split second

Latch-type valve closes instantly!
Piston-type valve opens instantly!

Sentry Valves are used on liquid and gas lines . . . protect property, materials and processing. Sizes 1½" to 8".

Have details on quick, positive action of this remarkable Coppus line at your fingertips. WRITE to COPPUS ENGINEERING CORPORATION, 392 Park Avenue, Worcester 2, Mass.

ANOTHER COPPUS "BLUE RIBBON" PRODUCT

Check 2640 opposite last page.

UNIQUE PUMP DESIGN IN PLASTIC NO STUFFING BOX OR SHAFT SEALS

ELIMINATES SHAFT LEAKAGE, SCORING, CORROSION

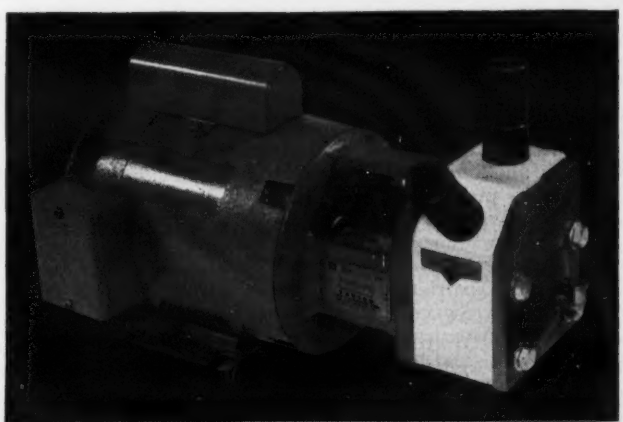
NEW LOW-MAINTENANCE FEATURES:

■ No shaft seals ■ No metal parts in contact with fluid ■ Simple, sturdy, minimal maintenance ■ Flexible liner absorbs abrasive action of suspended solids ■ Non-agitating ■ Non-contaminating ■ Self-priming; high vacuum ■ Operates wet or dry ■ Capacity range 1/3 to 40 Gallons Per Minute

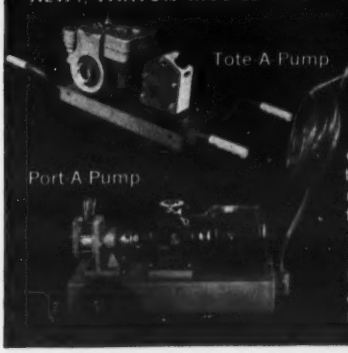
Vanton Plastic Pumps have for years been handling the toughest pumping problems in process plants, pilot operations, and laboratories. They do the routine jobs better, and save overall costs as well! Low-cost, versatile, simply but carefully engineered, their combination of radically new design principle plus plastic minimizes maintenance, gives complete protection against leakage, corrosion, contamination, abrasion.

OPERATES LIKE SQUEEGEE ON RUBBER HOSE: all fluid moves in channel between outside of flexible rubber or synthetic liner, and inside of molded plastic or stainless bodyblock. Pumping mechanism is rotor mounted on eccentric shaft inside liner. At each revolution it creates progressive squeegee action on fluid trapped between liner and housing.

Plastic Materials Include: PVC, high-temperature polyethylene, Teflon (DuPont), Buna N, bakelite, etc.; even stainless steel to handle any commercial corrosive.



NEW! VANTON MOBILE AND PORTABLE PUMPING UNITS!



These two new lightweight Vanton pump units are just the thing for pumping corrosive or abrasive fluids in emergency, occasional, mobile, or hard-to-get-at pumping situations in plant, pilot plant, lab, or field. Available in capacities 1/3-40 GPM (Tote-A-Pump 1/10-40 GPM), with handling and safety accessories. SEND FOR YOUR LITERATURE KIT TODAY!

WRITE FOR FREE CATALOG TODAY!

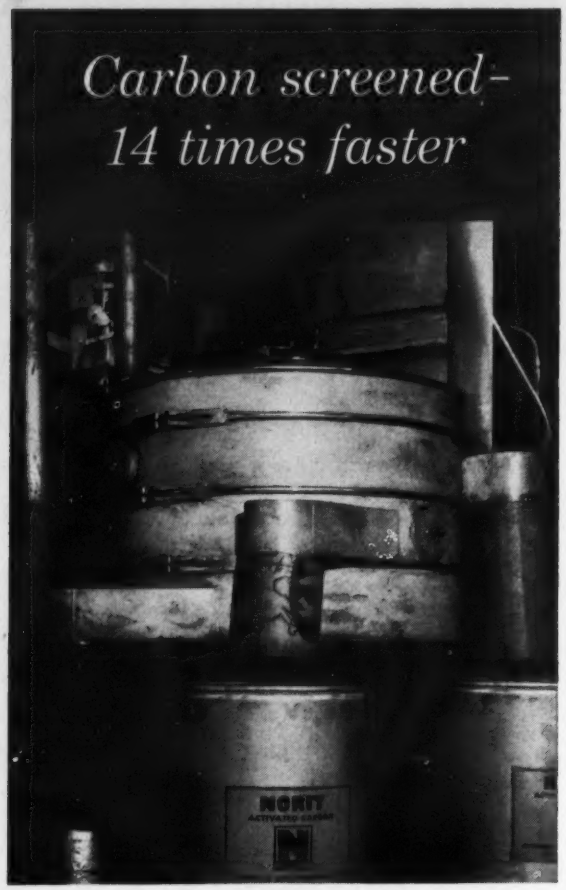
VANTON PUMP & EQUIPMENT CORP.

DIVISION OF COOPER ALLOY CORP., HILLSIDE, N.J.

SPECIALISTS IN PLASTIC FLUID HANDLING. PLASTIC PUMPS, VALVES, PIPING, FITTINGS, SPECIALTIES

Check 2641 opposite last page.

Carbon screened– 14 times faster



Efficient three-deck SWECO Separator screens granular activated carbon into three different fractions at rates up to 2700 lbs./hr. at the American Norit Company, Jacksonville, Fla.

American Norit wanted to increase production rates on their activated carbon. This material is used for purification and refining in the chemical, food and related industries.

A rectangular screening device could not solve the company's problem.

SWECO District Engineers demonstrated how a multi-deck SWECO Separator could screen several sizes of American Norit's own material in one operation – and at increased production rates.

American Norit then installed a 48" dia. SWECO Separator–equipped with screen cloths for various material sizes needed. This 3-deck SWECO unit can handle a throughput of activated carbon granules up to 2700 lbs. per hour – 14 times the 200 lbs. hourly rate of previous screening equipment.

If you have a screening problem, write for a test demonstration in your plant, on your own material. Or send for new 20-page catalog and screening data on your specific material.

Write Dept. S-305-3

Southwestern Engineering Company
4800 Santa Fe Avenue, Los Angeles 58, California
Engineers–Constructors–Manufacturers

SWECO

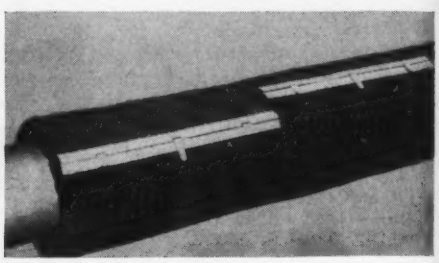
SEPARATORS FOR THE CHEMICAL INDUSTRY

Check 2642 opposite last page.

1—Since center tab is longer than two end tabs, it is slipped through slot on closure strip first and then bent over

2—With center tab holding pipe covering in place, two end tabs are pulled through slots and secured

3—Center tab, which has been serving a holding function, is now pulled up tightly and bent over



4—Section of insulated pipe. Closure strips are staggered to permit close abutment and prevent voids

Fast insulation application

. . . with new felt pipe covering which is held in place by folded tabs

Uses: Insulation for steam pipe, hot lines and outside cold-water lines.

Features: Insulation can be applied quickly due to tab-type fasteners. It goes on in single layer regardless of thickness.

Description: Formed pipe covering is made by felting and securing high-temperature mineral wool between metal fabrics of copper bearing metal lath and galvanized wire netting, held in place by soft galvanized tie wires.

Inside metal fabric is cut (and spaced for easier application) to fit outside circumference of insulation. Running along edges for full length of each section are two galvanized strips. One has flexible tabs; other has slots.

Pipe insulation is corrosion-resistant and non-combustible. It is capable of withstanding continuous high temperatures to 1200°F.

In an Underwriters' Laboratories Test, the mineral wood gained less than ½ of 1% in weight, after having been subjected to relative humidity of 100% for over 200 hours.

Insulation is manufactured in sections of two linear feet for nominal pipe sizes of 2 through 12". It is available for pipe diameters of 14 through 30". Larger sizes may be obtained by special order.

(Tab-Lok pipe insulation is product of The Eagle-Picher Company, American Bldg., Cincinnati 1, Ohio.)

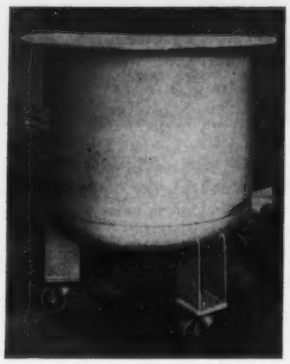
Check 2643 opposite last page.

a good team for steam

This Yarway team has scored high—over a million installed on all types of steam equipment. Stocked and sold by 270 Industrial Distributors. For free Steam Trap Book, write YARNALL-WARING CO., 125 Mermaid Ave., Philadelphia 18, Pa.

go YARWAY with confidence

Check 2644 opposite last page.



Non-sparking casters

. . . are used to eliminate safety hazards in chemical and pharmaceutical plants which use explosive or inflammable materials. Casters are made of non-conductive manganese-bronze wheels. They incorporate double-ball-bearing swivels.

(Manganese-bronze casters are product of Faultless Caster Corporation, Evansville 7, Ind.)

Check 2645 opp. last page.

Lab conducts studies on the safe use of chemicals

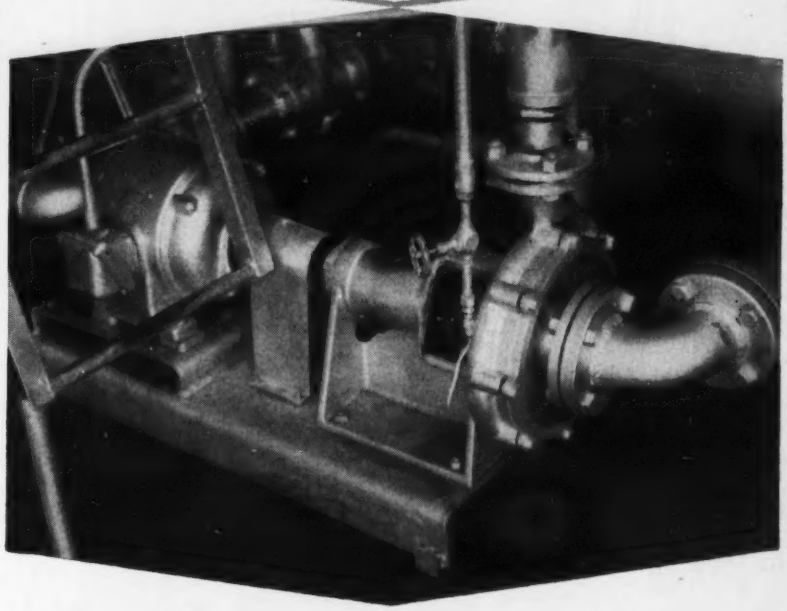
Research sponsored by Union Carbide

Greatly expanded facilities for research on the safe production, handling and use of chemicals will be provided by the recently opened Chemical Hygiene Building at Bushy Run, Pennsylvania, 25 miles east of Pittsburgh. Building will be operated by Mellon Institute under a Fellowship sponsored by Union Carbide Chemicals Company, division of Union Carbide Corporation.

Union Carbide has sponsored the Fellowship since 1937, during which period four million dollars has been spent for it. New facilities will meet the demand for increased investigation in this field for problems such as testing additives for food.

Research is necessary not only for additives made directly to food but also for products used on packaging materials that come in contact

ONLY DORR-OLIVER MAKES
3 different pump types
for complete chemical coverage



OLIVER TYPE "L" PUMP AT BARNETT LABS

PROVED

in 3 years of 24-hr. daily service

An outstanding alloy metal pump specifically designed to utilize a mechanical seal *or* a packed stuffing box is the Oliver Type "L" Centrifugal. One of the first stainless steel Type L's manufactured by Dorr-Oliver is in service at Barnett Laboratories, Inc., Long Beach, California Plant. This unit—with a packed stuffing box—is handling 100 gpm of water, carrot juice and natural sugars. In operation 24 hours a day, 7 days a week, for more than three years, the only maintenance it has required has been bearing replacement.

This is the kind of service you can expect from pumps made by Dorr-Oliver—the only major manufacturer offering three distinctly different types of pumps for complete coverage of all needs of the chemical processing industries. For information on types, sizes and performance data, write for Bulletin No. 5000.

DORR-OLIVER
WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT

Oliver T. M. Reg. U. S. Pat. Off.

Check 2646 opposite last page.

Upper level of Chemical Hygiene Building houses the biochemical, physiological and micropathological laboratories and the administrative offices and library. Lower level, comprising about twice the floor area of the upper level, provides quarters for the various species of animals used in assaying the toxicity of synthetic organic chemicals

with food. (See article, this issue page 30.) Effect of chemicals on skin and eyes and effect of breathing vapors are among other problems studied by laboratory.

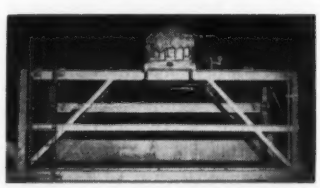
Chemical Hygiene Laboratory is being directed by Dr. Henry F. Smyth, Jr., one of the outstanding toxicologists in the country.

Debris removed efficiently from water-gate fronts

Uses: Cleaning debris from trash racks or screens in front of gates where water is required in large volume.

Features: Rake is self-guiding, self-clearing and self-dumping.

Description: Electrically driven mechanism handles complete range of depths with low power consumption. One-man operation permits rake to travel across face width of rack bars extending across forebay.



Mechanical rake is self-guiding, self-clearing and self-dumping

(Mechanical rake is product of Frank W. Stuker and Associates, 360 Delaware Ave., Buffalo 2, N.Y.)

Check 2648 opposite last page.

The man who knows his process equipment . . . chooses G-B Evaporators!

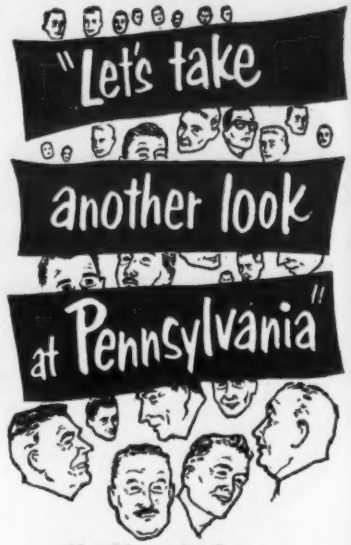
While we rarely ever get a chance to meet and do business with a fellow like this, you will find G-B Evaporators in many of America's major distilleries.

Men who know their process equipment in the aluminum, paper, sugar and other chemical fields have been specifying G-B evaporators since 1879.

We'll be glad to send you a list of experts who have chosen G-B equipment along with more comprehensive information on the complete line. A postcard will do.

GOSLIN-BIRMINGHAM
MANUFACTURING CO., INC.
P. O. BOX 631 BIRMINGHAM, ALABAMA

Check 2647 opposite last page.



. . . that's what a growing number of industrial executives are saying and doing!

For the three and a half years—'56, '57, '58, and '59 to date, they announced:

307 NEW PLANTS
258 RE-OPENINGS OF IDLE PLANTS
666 PLANT EXPANSIONS

(Send for the list—address below)

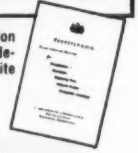
They are finding:

Surplus of industry-minded workers . . . Strategic locations in the great Eastern market with access to major trunk line railroads, and modern highway and Turnpike networks . . . Ports on the Atlantic, St. Lawrence Seaway and Ohio River system . . . All types of industrial raw materials and components . . . 100% low-interest plant financing in labor surplus areas . . . Choice of industrial "parks" and individual plant sites.

In Terms of Taxes:

- No state property tax
- No state tax on personal income
- Manufacturing exemption for capital stock and franchise taxes
- Low local property taxes
- No tax on machinery or inventories

For free copy of "Plant Location Services" pamphlet, or for details on 100% financing, write or call:



Pennsylvania Department of Commerce
South Office Building
623 State Street, Harrisburg, Pa.
Phone: CEdar 4-2912

Check 2649 opposite last page.

Moved Recently?

If you have, you will want to make sure that your copy of CHEMICAL PROCESSING will continue to come to you on time.

Maybe . . .

you have received a promotion and have been transferred to a new location.

Or, if you have changed your affiliation, we want to make sure that your copies of CHEMICAL PROCESSING will follow you.

Fill out . . .

the slip opposite the back cover. Be sure to answer all questions regarding your new location, title, and company.

In addition, give us your former address, including company, city, state.

Mail this slip to the Reader Service Department and we will make sure you will continue to receive each issue of the magazine promptly.

For more information on product at right, specify 2650 see information request blank opposite last page.

TUBING INSTALLATIONS DON'T HAVE TO BE A HEADACHE!

That's a pretty broad statement, but there is absolutely no reason why you have to live with the most minute leak in your tubing installations. Nor is there any reason why you have to suffer the slightest inconvenience in obtaining the most dependable tube fitting in a particular size, shape or material needed to provide the type of leakproof, trouble-free installation you have every right to expect!

Whether your application involves corrosion resistance, temperature, pressure or vacuum, SWAGELOK has a complete stock of standard and unusual shapes (in sizes for 1/16" through 1" O.D. tubing) which can be provided in **any** machinable metal or plastic.

Write for our latest, complete Swagelok catalog.

Swagelok® TUBE FITTINGS

CRAWFORD FITTING COMPANY

884 East 140th Street • Cleveland 10, Ohio

Crawford Fittings (Canada), Ltd. • Niagara Falls, Ontario, Canada

BUILT-IN REINFORCEMENT

LENAPE TYPE H

HEAVY SEAMLESS WELDING NECKS

Where reinforcement of conventional welding necks is required, most cost-conscious pressure vessel designers specify Lenape Type H. These heavy reinforcing necks normally eliminate the need for costly, cumbersome pads, while providing substantially greater corrosion allowance and service life. Optional nut stop construction permits easy bolting using only one wrench.

Lenape Type H Reinforcing Necks are available in 300 to 2500 lb. ASA standards. For installation in tight quarters, the ends can be formed with a 2:1 oval section, such as have been used on the Clark Bros. centrifugal compressor shown above.

Additional information and complete specifications on Lenape Type H Reinforcing Necks are given on pages 16-18 in Catalog 10-53, a copy of which will be sent upon request.

LENAPE PRESSURE VESSEL CONNECTIONS

See our standard line of pressure vessel connections on pages 448-449 in the 1959 Chemical Engineering Catalog.

LENAPE HYDRAULIC PRESSING & FORGING CO.
DEPT. 100 WEST CHESTER, PA.
RED MAN PRODUCTS

Check 2651 opposite last page.

Full flow at 3000 psi with check valve

Uses: In all types of hydraulic and pneumatic systems.

Features: Unit is designed to allow full flow at operating pressures to 3000 psi, with minimum pressure drop. It also provides quick opening and positive closing.

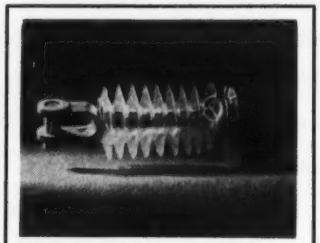
Description: Check valve incorporates seal ring with dual seating action. This gives leakproof performance at both high and low pressures. Wrench portion of body is square. Standard sizes are available for tube connections of ¼ to 2".

(Quality Seal check valve is product of Quality Control Corp., 7315 W. Wilson Ave., Chicago 31, Ill.)

Check 2652 opposite last page.

Diaphragm pumps, for handling abrasive or thick materials or fluids, are reviewed in four-page Bul 148 — T. Shriver & Company, Inc., 810 Hamilton St., Harrison, N. J.

Check 2653 opposite last page.

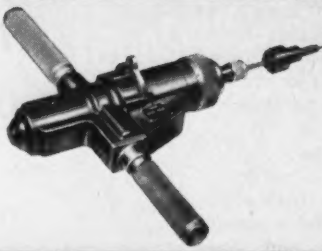


Plastic film boot

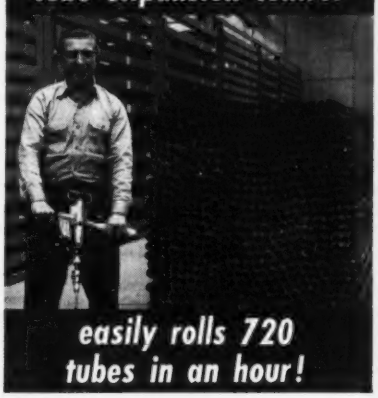
. . . has minimum thickness for a given expansion. Often, boot fits on existing hydraulic or air cylinders without cutting down stroke. Design incorporates hermetic sealing against corrosive liquids, as well as against abrasive grits, dusts and sludges. Boot can be transparent. Therefore, any oil leakage is trapped and made evident. There is no limit on length. It is available in various shapes, sizes and colors.

(P-F plastic film boot is product of A. F. Gagne Associates, 50 Wall Street, Binghamton, New York.)

Check 2654 opp. last page.



with AIRETROL tube expansion control



It's no trick at all to roll up to twelve Heat Exchanger tubes per minute with Airetrol, automatic tube expansion control. Operator merely dials desired torque on tool's micrometer head. Precision torque sensing mechanism automatically stops expansion at this setting. Pneumatically-operated Airetrol maintains .001" accuracy consistently. Write us for obligation-free demonstration, or descriptive Bulletin No. 64.

BRANCH OFFICES: New York, Chicago, Tulsa, Philadelphia, Houston, Baton Rouge.
REPRESENTATIVES in principal cities of U.S.A., Canada, Mexico, South America, England, Europe, Puerto Rico, Italy, Japan, Hawaii
EUROPEAN PLANT: Vlaardingen, The Netherlands
CANADIAN PLANT: Brantford, Ontario

Check 2655 opposite last page.

THAT'S INTERESTING

Engineering beefed up

The college of engineering at Ohio State University has been reorganized. A pre-engineering division has been formed for the first two years of professional study, and a professional division for the last three years of the five-year program. For a degree, a candidate must complete work of the latter division.

Washday boon

Here's a new way to keep your wife happy on washday — outfit yourself with disposable clothing. A company has been formed in New York to make and sell exclusively disposable paper clothing. Product line includes shirts, pants, laboratory or shop coats, aprons, hats, over-shoes and medical examination gowns.

For more information on product at right, specify 2656 see information request blank opposite last page.

WON'T BURN! WON'T SHRINK! WON'T THERMAL-SHOCK!

UNARCO

UNIBESTOS®

—the pipe insulation that's worth more money

There's never a peep from installation or maintenance crews—or from the front office—when UNIBESTOS is specified. It cuts and fits easily . . . goes on faster . . . takes all the heat it's designed for. Sizes to 44" o.d. Temperatures to 1200°F. Write for Catalog F76-321 with exclusive "J" Factor Tables. Union Asbestos & Rubber Company, General Sales Offices: 1111 W. Perry St., Bloomington, Illinois. Distributors in principal cities.

Pioneer producer of spray dried paper clays paces market growth with third spray dryer...
"Production of spray dried paper coating clays expanded to four times original capacity!" That will be the story at Minerals and Chemicals Corporation of America, when an additional Nerco-Niro spray dryer now being installed comes on stream in 1959.
Moisture content of the dried product is under one-half of one per cent, with no attrition of the fine particles and no burning or discoloration of this heat-sensitive clay.
As pioneers in design of spray dryers for paper clays, Nerco-Niro have built spray dryers accounting for 70% of the total U. S. production capacity within this field.
NERCO NIRO
Nerco-Niro Spray Dryer Div.
NICHOLS
ENGINEERING & RESEARCH CORPORATION
70 Pine St., New York 5, N. Y.
San Francisco
Indianapolis
Montreal

Check 2657 opposite last page.

NEW LITERATURE

Plant Engineering
Maintenance & Safety

Cup wheels for portable grinding are depicted in four-page bulletin, which includes specifications and starting recommendations. Cup Wheel Bul—Advertising Branch, The Carborundum Company, Niagara Falls, N.Y.

Check 2658 opposite last page.

Molded, extruded rubber parts, for use on various types of machinery, are clarified in six-page Bul AD-167 — The Garlock Packing Company, 436 Main St., Palmyra, N. Y.

Check 2659 opposite last page.

Check-valve information is contained in eight-page pamphlet which includes cutaway views of various applications. Form 300A —Durabla Manufacturing Company, 114 Liberty St., New York 6, New York.

Check 2660 opposite last page.

Dielectric heating is explained in a bulletin which provides data concerning output and dimensions of dielectric ovens with 15, 30, 60, 100 and 150 kw output ratings. Bul 56-E—Young Brothers Company, 1831 Columbus Rd., Cleveland 13, Ohio.

Check 2661 opposite last page.

Shaped tube, in square, rectangular, elliptical, oval and other types of cross-sections, is depicted in four-page Data Memorandum 17 —Superior Tube Company, 1512 Germantown Ave., Norristown, Pennslyvania.

Check 2662 opposite last page.

Automatic voltage regulators, for applications requiring instantaneous correction of AC-line-voltage fluctuations, are reviewed in eight-page Bul S259IET — Dept. IET, The Superior Electric Company, 83 Laurel St., Bristol, Conn.

Check 2663 opposite last page.

Forming tubular heaters is explained in four-page article reprint, Bul GER-1563—General Electric Company, Schenectady 5, New York.

Check 2664 opposite last page.

Flammable-liquid safe handling and application is considered in a catalog, which is divided into six general plant operating sections. Safety Engineering Cat is available upon request on company letterhead from The Protectoseal Company, 1920 S. Western Ave., Chicago 8, Ill.

Temperature conversion from centigrade to fahrenheit and vice versa is easily accomplished with a Temperature Conversion Chart —Beacon Chemical Industries, Inc., 33-51 Richdale Ave., Cambridge 40, Mass.

Check 2665 opposite last page.

Electromagnetic-clutch line, in six series with torque capacities of 1.8 through 13,000 lb-ft, is detailed in 20-page bulletin which includes specifications, drawings and photographs. Bul R-6304-1B — I-T-E Circuit Breaker Company, 1900 Hamilton St., Philadelphia 30, Pa.

Check 2666 opposite last page.

Structural aluminum is considered in detail in 418-page hard-cover-bound book, which is sixth revision of this work. Current version involved changes in text, general up-dating of tables and addition of several new tables. Extensive data on aluminum-magnesium alloys and comprehensive coverage of welded-structure design are included in "Alcoa Structural Handbook"—Aluminum Company of America, 789 Alcoa Bldg., Pittsburgh 19, Pa.

Check 2667 opposite last page.

Clutches are reviewed in 27-page booklet, which includes detailed selection data and application diagrams, in addition to various tables. "Curtiss-Wright Clutches"—Marquette Division, Curtiss-Wright Corporation, 1145 Galewood Dr., Cleveland 10, Ohio.

Check 2668 opposite last page.

Plastic pneumatic valves, constructed completely of high-density polyethylene, are detailed in four-page Plastic Valve Bul—Illinois Water Treatment Company, 840 Cedar St., Rockford, Ill.

Check 2669 opposite last page.

Safety glasses of plastic and metal, specially designed goggles and eye shields, and complete specifications for lenses are incorporated in 40-page Cat A-1762—Safety Products Dept., Bausch & Lomb Optical Co., Rochester 2, N. Y.

Check 2670 opposite last page.

Trace gas analyzer is presented in four-page bulletin which incorporates schematic flow diagrams. Bul 0714-3—Mine Safety Appliances Company, 201 N. Braddock Ave., Pittsburgh 8, Pa.

Check 2671 opposite last page.

Plastic pipe, of rigid and semi-rigid types is specified in Plastic Pipe Spec Manual — Franklin Plastics Inc., Franklin, Pa.

Check 2672 opposite last page.

for uniform results

in . . . **BAKING**
DRYING
CURING
DEHYDRATING

select

YOUNG BROTHERS OVENS and **DRYERS**

designed and built for individual product and process requirements

Batch and Conveyor Types up to 1000° F

Gas, Electric, Steam, Oil — Radio Frequency Power

Write for Bulletin 157

YOUNG BROTHERS CO.

1825 Columbus Road • Cleveland 13, Ohio

Over 60 years of service

Check 2673 opposite last page.

MECO SINCE 1910

. . . the answer to your CONVEYOR AND ELEVATOR problems . . .

Whatever the materials to be handled . . . the need for rugged, reliable, equipment . . . installation space limitations . . . MECO can supply the answer with Conveyors and Elevators, designed, engineered, and manufactured, *to meet your specific requirements!* MECO Conveyors and Elevators embody features and advantages gained in nearly 50 years of experience in the manufacture of material handling equipment—assure efficient, economical operation, and years of trouble-free service—are giving the utmost in satisfaction to numerous users in the chemical, plastics, ceramics, coal, sand and gravel, non-metallic and other industries.

MECO Centrifugal discharge Elevator, feeding conveyor.

MECO Conveyor with hopper and chute for material blending.

For additional information, write today for Bulletins No. 576 & No. 577. Literature mailed promptly. For immediate action, call collect!

THE MANUFACTURERS EQUIPMENT COMPANY

218 MADISKA AVE • DAYTON 4, OHIO • Phone BA 2-5343

Check 2674 opposite last page.

ENGINEERING & SAFETY

Gasket materials, consisting of felts impregnated with Teflon, are delineated in a bulletin which covers products' properties, potential uses, case histories and availability, and includes table of physical properties. Armalon Bul — Fabrics Division, E. I. du Pont de Nemours & Company, Fairfield, Conn.

Check 2675 opposite last page.

Combustion controls are introduced in four-page bulletin which outlines basic operations of unit. Protectofier Bul—Protection Controls, Inc.—6000 N. Legett Ave., Chicago 46, Ill.

Check 2676 opposite last page.

Fractionating oil-diffusion pumps are detailed in four-page bulletin which includes graphs and tables. Cat Bul 3290.1—Kinney Manufacturing Division, The New York Air Brake Company, 3529 Washington St., Boston 30, Mass.

Check 2677 opposite last page.

Proportioning pumps are pictured in 18-page brochure which contains details on variety of models manufactured by Lewa O.H.G. of Stuttgart, Germany. Lewa Brochure—Neumann & Weaver, Inc., 22-02 Raphael St., Fair Lawn, New Jersey.

Check 2678 opposite last page.

Semiconductor industrial rectifiers are subject of six-page paper, which gives basic explanation of uses and types, covering such topics as monitoring and indicating of failures, current and voltage balance, overload protection, voltage surges, cooling and power factor. Industrial Rectifier Tech Paper may be obtained by letterhead request from Perkin Engineering Corp., 345 Kansas St., El Segundo, Calif.

"Take the afternoon off —I want to think."

CAMBRIDGE GAS ANALYZERS

at the 26th EXPOSITION OF CHEMICAL INDUSTRIES BOOTH NO. 376

PORTABLE pH METERS AND RECORDERS for biological, chemical processing; laboratory and plant use

SINGLE AND MULTI-POINT CO_2, H_2, CO, SO_2, and CL_2 ANALYZERS for process and controlled atmospheres, furnace and generator gases

COMBINATION CO_2, O_2, COMBUSTIBLES RECORDER for kiln gases, fruit storage rooms, inert gas generators

COMBINATION DISSOLVED O_2/H_2 ANALYZERS (the latter model as recently endorsed by ASTM) —for steam generating plants

HYDRAZINE RECORDER to control N_2H_4 intake to boiler feedwater

Other precision instruments widely used in a variety of industries will be shown: Needle, Roll and Mold Pyrometers; Moisture Indicators; Paper Hygroscope; Exhaust Gas Testers; Portable Hydrogen Purity Analyzer; Nuclear Measuring Instruments, Fabric Permeameters, etc.

Visit us at Booth 376 or send for descriptive literature on any specific instrument; better yet *detail your problem* for our recommendations.

CAMBRIDGE INSTRUMENT COMPANY, INC.

3541 Grand Central Terminal, New York 17, N. Y.

PIONEER MANUFACTURERS OF PRECISION INSTRUMENTS

Check 2679 opposite last page.

PISTON PACKING PROBLEMS SIMPLIFIED!

Conventional and 45° bevel type Pumcups.

• The *right* piston packing for reciprocating pumps and cylinders goes a long way toward eliminating the problems of slippage, maintenance and down-time.

Because Darcova Pumcups are made in a complete range of sizes, various types, and in many texture-engineered compositions, they *fit* your temperature-pressure-fluid conditions. That's one important reason why they usually outlast other packing at least 3 to 1 while holding top efficiency to the last!

Why not get *all* the facts? Send today for Bulletin No. 5903.

DARLING VALVE & MANUFACTURING CO.

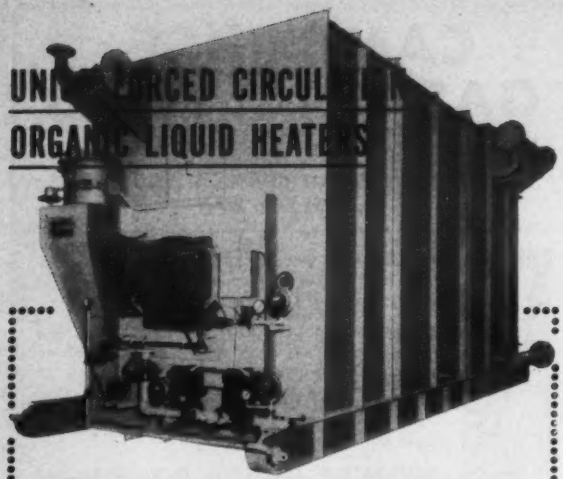
Williamsport 4, Pa.

DARCOVA

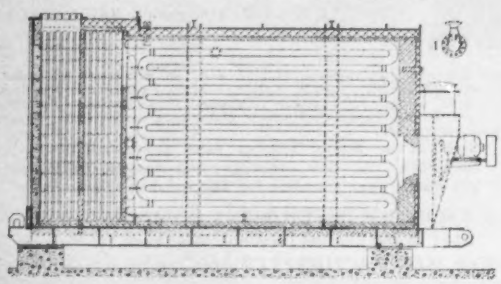
TRADE MARK

PUMCUPS

Check 2680 opposite last page.



10,000,000 BTU/hr. FORCED CIRCULATION LIQUID HEATER. Fully automatic. Gas and oil fired. Packaged unit with Union combustion control and flame safeguarding system for precise temperature control.



SHOP ASSEMBLED UNITS INSTALLED WITHOUT COSTLY FIELD BALANCING

Right from the start, you can save with a Union shop assembled Forced Circulation Heater. With all of its circuits of the same hydraulic length, time consuming field balancing can be eliminated. Most units do not require orifices or any other mechanical adjustments to equalize flow at the time of installation.

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Check 2681 opposite last page.

ENGINEERING & SAFETY

Platinum-metal products, including solid and clad platinum metals and alloys in sheet, strip, wire, foil and seamless tube, are pictured in eight-page brochure, "Platinum-Group Metals"—Metals & Controls, Division of Texas Instruments Incorporated, 34 Forest St., Attleboro, Mass.

Check 2682 opposite last page.

Fuel-oil additives' use in solving problems, such as sulfur and vanadium corrosion, sludging of fuel oils and rusting of fuel-oil tanks, is detailed in "Fuel Oil Additive Manual"—Department of Industrial Research, L. Sonneborn Sons, Inc., 300 Park Ave. S., New York 10, N.Y.

Check 2683 opposite last page.

Rotating unions. are expanded upon in 20-page bulletin, which includes cutaway photos. Rotating Union Bul—Deublin Company, 1919 Stanley St., Northbrook, Ill.

Check 2684 opposite last page.

Pumps of various types are covered in 20-page bulletin which includes pictures and drawings. Bul 203-8—Lawrence Pumps, Inc., 371 Market St., Lawrence, Mass.

Check 2685 opposite last page.

Welded-metal-bellows design is treated in 20-page manual, which contains formulas permitting computation of reasonable design parameters for welded-metal bellows. A slide rule is also available to expedite such calculations. Welded Metal Bellows Design Manual and Bellows Design Slide Rule — The Belfab Corporation, 89 Hobson Ave., Hamden, Conn.

Check 2686 opposite last page.

Industrial gloves and finger cots are itemized in Cat WR-459-28 — Industrial Division, The Wilson Rubber Company, Division of Becton, Dickinson and Company, 1200 Garfield Ave., S.W., Canton 6, Ohio.

Check 2687 opposite last page.

Fume hoods are delineated in 48-page catalog which includes detailed engineering data and specifications on all types of fume hoods. Fume Hood Bul—Kewaunee Mfg. Co., 5011 S. Center St., Adrian, Mich.

Check 2688 opposite last page.

Maintenance safety precautions are itemized on three single-page data sheets — SD-591, SD-595 and SD-599 — Puritan Chemical Company, 916-932 Ashby St., N.W., Atlanta 18, Georgia.

Check 2689 opposite last page.

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manufacturers' current literature

This section features a variety of literature currently available from manufacturers. See also the other sections in this issue for new literature pertaining to those particular sections

Chemical Materials

Essential oils, aromatic chemicals and specialties, and certified colors are priced in 36-page catalog which includes short descriptions of various products. Price Cat—Dodge & Olcott, Inc., 180 Varick St., New York 14, N.Y.

Check 2690 opposite last page.

Dibutyl sebacate, plasticizer for use with vinyls, cellulosics, synthetic rubbers and polymers, is reviewed in Dibutyl Sebacate Literature—The C. P. Hall Co., 5245 W. 73rd St., Chicago 38, Ill.

Check 2691 opposite last page.

Nitrogen tetroxide information and application data are subject of 59-page bulletin, "Nitrogen Tetroxide"—Dept. NT13-2-2, Nitrogen Division, Allied Chemical Corporation, 40 Rector St., New York 6, N.Y.

Check 2692 opposite last page.

Alkylphenol solvents, which are insoluble in water and soluble in common organic solvents, are expanded upon in Alkylphenol Solvents Literature — Antara Chemicals Division, General Aniline & Film Corporation, 435 Hudson St., New York 14, N.Y.

Check 2693 opposite last page.

Processing Equipment

Centrifugals are specified in Centrifugal Literature—Tolhurst® Division, American Machine and Metals, Inc., East Moline, Illinois.

Check 2694 opposite last page.

Drying equipment, including conveyor, spray, tray and truck dryers, is covered in Bul 448 — Proctor & Schwartz Inc., 7th St. and Tabor Rd., Philadelphia 20, Pa.

Check 2695 opposite last page.

Dust collectors are reviewed in Bul C-958 — The Ducon Company Inc., 147 E. Second St., Mineola, L.I., N.Y.

Check 2696 opposite last page.

Fluids equipment, including reactors, is detailed in a buyers' guide, Bul 980—Dept. CP-129, Pfaudler Division, Pfaudler Permutit Inc., Rochester 3, N.Y.

Check 2697 opposite last page.

Vertical mixers are detailed in Bul 192—Sprout, Waldron & Co., Inc., Muncy, Pa.

Check 2698 opposite last page.

Customized chemical-plant equipment, including towers, stills, condensers, pressure vessels and many other items, is covered in Chemical-plant Equipment Literature — Sun Shipbuilding & Dry Dock Company, Chester, Pa.

Check 2699 opposite last page.

Dispersers, grinders, mixers are outlined in Disperser, Grinder and Mixer Literature — Chas. Ross & Son Co., Inc., 154 Classon Ave., Brooklyn 5, N.Y.

Check 2700 opposite last page.

Continuous filters of scraper type are depicted in Continuous Filter Literature — Filtration Engineers, Inc., Division of American Machine and Metals, Inc., East Moline, Illinois.

Check 2701 opposite last page.

Plant Engineering and Maintenance

Pipe insulation, in sizes to 44" OD for temperatures to 1200°F, is delineated in Cat F76-321 — Union Asbestos & Rubber Company, 1111 W. Perry St., Bloomington, Ill.

Check 2702 opposite last page.

Variable-speed drives, utilizing metal self-tooth-forming chains, in ratings of ½ to 25 hp, are summarized in Book 2274 — Link-Belt Company, Prudential Plaza, Chicago 1, Ill.

Check 2703 opposite last page.

Protective coatings of various types are expanded upon in 16-page bulletin which contains application information and case histories. Well illustrated with photographs, bulletin features information concerning synthetic-rubber compound for general use in expansion joints and for caulking, glazing and sealing. Protective Coating Bul—David E. Long Corp., 220 E. 42nd St., N.Y. 17.

Check 2704 opposite last page.

Wire cloth is reviewed in 94-page Wire Cloth Cat — Dept. F, The Cambridge Wire Cloth Co., Cambridge 12, Md.

Check 2705 opposite last page.

Roof and pipe insulation, of sealed-glass-cell construction, are depicted in Foamglas Pipe Insulation and Foamglas Roof Insulation Buls—Dept. CP-129, Pittsburgh Corning Corporation, One Gateway Center, Pittsburgh 22, Pennsylvania.

Check 2706 opposite last page.

Dryers, to handle dew points below −110°F, in volumes of a few or thousands of cfph, are depicted in Drying Literature—Pittsburgh Lectrodryer Division, McGraw-Edison Company, 352 32nd St., Pittsburgh 30, Pa.

Check 2707 opposite last page.

Fluids Handling

Steam traps of various types are illustrated and described in Steam Trap Book—Yarnall-Waring Co., 125 Mermaid Ave., Philadelphia 18, Pennsylvania.

Check 2708 opposite last page.

Chemicals pumps, for system pressures to 5000 psi, temperatures to 1000°F and capacities to 600 gpm, are subject of "Request for Quote" Data Sheet — Chempump Division, Fostoria Corporation, Buck and County Line Roads, Huntingdon Valley, Pa.

Check 2709 opposite last page.

Valve-stem packings of high-temperature type are considered in Valve-stem Packings Literature — Packing Division, Raybestos-Manhattan, Inc., Passaic, N.J.

Check 2710 opposite last page.

Expansion joints, of all-Teflon, Teflon-lined and all-rubber types, are delineated in Expansion Joint Cat AD-137—The Garlock Packing Company, Palmyra, N.Y.

Check 2711 opposite last page.

Progressing-cavity pumps, which each have only one moving part, are covered in Bul 40 CP—Robbins & Myers, Inc., Springfield, Ohio.

Check 2712 opposite last page.

Steam traps, of thermostatic, liquid-expansion, float-thermostatic, thermodynamic and bucket types, are considered in Steam Trap Literature — Sarco Company, Inc., 635 Madison Ave., New York 22, N.Y.

Check 2713 opposite last page.

Pump-selection information is incorporated in Pump Literature — Dept. CP-59, Goulds Pumps Inc., Seneca Falls, N.Y.

Check 2714 opposite last page.

Type H seamless welding necks, available in 300- to 2500-lb ASA standards, are among items detailed in Cat 10-53 — Dept. 100, Lenape Hydraulic Pressing & Forging Co., West Chester, Pa.

Check 2715 opposite last page.

Plastic pipe is subject of 20-page bulletin, incorporating information on properties, chemical resistance and costs of 11 plastic and rubber materials. Bul CE-50—American Hard Rubber Company, Division of Amerace Corporation, Ace Rd., Butler, N.J.

Check 2716 opposite last page.

Geared flexible couplings, which have torque-transmitting parts machined from cold-rolled steel, are considered in Folder 2875—Link-Belt Company, Prudential Plaza, Chicago 1, Ill.

Check 2717 opposite last page.

Material Handling and Packaging

Conveyor-belt cleaner, which has no moving parts and requires no drive, is presented in Bul 258 — Standards Products Division, Stephens-Adamson Mfg. Co., 11 Ridgeway Ave., Aurora, Ill.

Check 2718 opposite last page.

Pneumatic-system selection, operation and maintenance are subjects of technical article which illustrates and describes positive, negative and combination systems. Bul I-28—Sprout, Waldron & Co., Inc., Muncy, Pa.

Check 2719 opposite last page.

Polyester film, which resists temperatures in −70 to +240°F range, is expanded upon in Scotchpak Literature — Dept. CAE-129, Film Products Group, Minnesota Mining and Manufacturing Company, St. Paul 6, Minn.

Check 2720 opposite last page.

Oscillating conveyors, for light-, medium-, or heavy-duty service, are clarified in Book 2774 — Link-Belt Company, Prudential Plaza, Chicago 1, Ill.

Check 2721 opposite last page.

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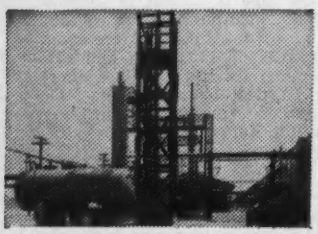

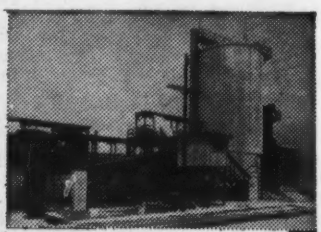

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CURRENT LITERATURE

Tractor-shovel, with 2500-lb carrying capacity and 6' turning radius, is treated in H-25 Payloader Data — The Frank G. Hough Co., Subsidiary of International Harvester Company, Libertyville, Ill.

Check 2722 opposite last page.

Instrumentation

Indicating pneumatic controller and valve positioner combination, for temperature or pressure control and valve positioning, is expanded upon in Bul F029 — United States Gauge, Division of American Machine & Metals, Inc., Sellersville, Pa.

Check 2723 opposite last page.

Liquid-level controllers, for handling level changes of 0.0025" to 150' with single or multi-stage switching, are tabulated in Liquid-level Control Cat — Magnetrol, Inc., 2129 S. Marshall Blvd., Chicago 23, Ill.

Check 2724 opposite last page.

Chemical-feed pumps, which have accuracy of ±1% and capacities to 1624 gph, are outlined in 200 Series Literature—Pump Division, American Meter Company Incorporated, 13500 Philmont Ave., Philadelphia 16, Pa.

Check 2725 opposite last page.

Liquid-level gages, including reflex type in three pressure groups to 3600 psig and lengths to 12', are delineated in Cat 36 — Pemberthy Manufacturing Company, Division of Buffalo-Eclipse Corporation, Prophetstown, Ill.

Check 2726 opposite last page.

Metering pump, which will vary its microflow rate of output automatically to a changing process condition, is specified in Bul 500-A—Process Equipment Division, Lapp Insulator Co., Inc., 3512 Poplar St., LeRoy, N.Y.

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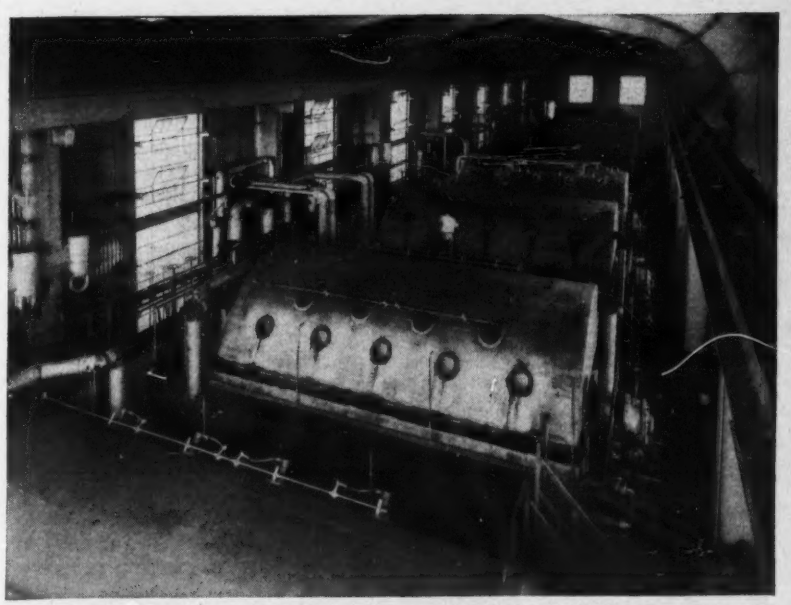

The three filters shown above are typical of filters insulated with FOAMGLAS. These 21' by 11' diameter filters, insulated with layers of 2" and 3" FOAMGLAS, separate wax from oil. The refinery, largest in the Mobil system, has a rated capacity of 220,000 barrels per day.

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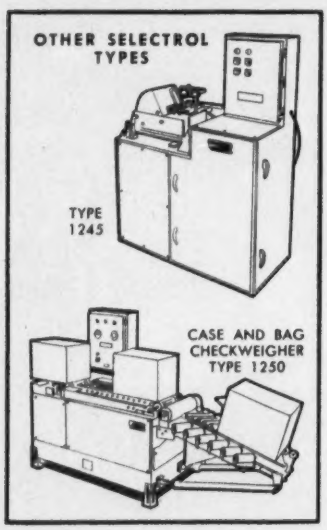

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Brushed or sprayed on like ordinary paint, DetectoTemp provides accurate measurement within ±9° F. in ranges from 104° F. to 2912°F. Some of the 40 different paints in the DetectoTemp family show one color change, others change up to four times as temperatures rise. An outstanding advantage of DetectoTemp paints is that the color change either lasts for many hours or is permanent, leaving a record that can be seen after cooling.

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Check 2730 opposite last page.

Handles Bulk Materials Gently

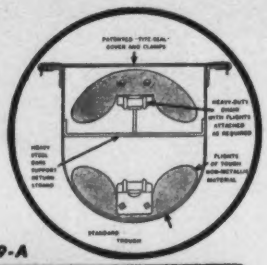
The NEW **Super-Flo** TRADE MARK CONVEYOR

DEVELOPED FOR FAST, EFFICIENT CONVEYING USING A SINGLE "U" SHAPED TROUGH

CONVEYS HORIZONTALLY OR ON AN INCLINE OR COMBINED — IT'S GREAT!

Offers: ECONOMICAL OPERATION, SELF-CLEANING, LOW HORSEPOWER, LONG LIFE, SIMPLE MAINTENANCE, EXTREME COMPACTNESS and MINIMUM DEGRADATION OF MATERIAL

Flights carry a deep load. Their shape fits contour of trough giving positive wiping action. Can be had in any length with spouts to suit. Tite-Seal Cover and Clamps provide dust-tight construction.



The big demand for Super-Flo Conveyors has necessitated equipping our Santa Clara, Cal. plant for full production. Prompt shipments also made from our Hammond, Ind. and Winona, Miss. plants.

Write for BULLETIN SF-659-A

Screw Conveyor Corporation
617 HOFFMAN STREET • HAMMOND, INDIANA
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TRADE MARK REG. U.S. PAT. OFFICE

Check 2731 opposite last page.

INSTANT SETTING FLOOR PATCH

Repair broken factory floors without the usual traffic tie-up. Simply shovel INSTANT-USE into hole or rut — tamp smooth — truck over! No waiting! INSTANT-USE bonds tight to old concrete — right up to a feather edge. It's tough. Wears like iron. Won't crack or crumble. Install complete overlay where floors are badly chewed up. Used indoors or out. Immediate shipment.

MAIL COUPON for TRIAL OFFER and FREE BROCHURE

INSTANT-USE

FLEXROCK COMPANY (Offices in principal cities)
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Please send me complete INSTANT-USE information, details of TRIAL ORDER PLAN and Free INSTANT-USE BROCHURE—no obligation. (Clip and attach Coupon to Co. letterhead).

Name .....
Title .....
Company .....
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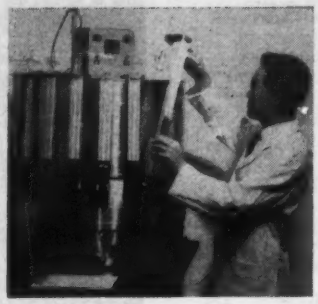
Check 2732 opposite last page.

that's interesting

Thought-provoking slants on projects and products



Taking the count on bugs' breath

"Take a deep breath." "Now let it out slowly," are pet phrases of physicians checking a patient's respiration.

But at Nalco Chemical Company, the "patients"—in this case microbes—are too tiny for use of a stethoscope. So a Warburg Respirometer is used to determine the oxygen uptake and carbon dioxide production of organisms.

Information obtained from the respirometer is an important factor in helping Nalco improve products for water treating applications.

Urethane may take bounce out of riding

The auto you buy in the future might ride more smoothly and may be roomier because of the development of a rubber-like synthetic by The Dayton Rubber Company.

Cast urethane, formed from liquid components, is placed in a thin layer between two metal sleeves, creating a drive shaft torsion elastic spring. This permits transmission of full engine torque yet dampens vibration and cushions shock.

The cast urethane, poured into a mold, sets up and forms a permanent bond with any surface. Because of its adhesive qualities, the material has made possible a smaller drive shaft coupling. This, the company says, could lead to smaller drive shaft humps in cars of the future.

A SAFETY SHIELD for both gauges and personnel. Complete protection assurance is a result of the keen design logic characteristic of all Circle Seal valves. The new contact-seal principle employed in the Gauge Protector eliminates "O" ring breakaway friction, and assures instantaneous operation and complete gauge isolation whenever line pressure exceeds gauge pressure range. This same quick action prevents gauge damage when bourdon tubes fail, or pressure surges exceed gauge limits. The gauge is returned to service just as quickly when line pressure drops to normal maximum.

Available in a variety of materials, the Series 1100 Gauge Protectors are adaptable to virtually all gas or liquid systems operating at pressures up to 2400 psi, and at temperatures ranging from –100° to 500° F.

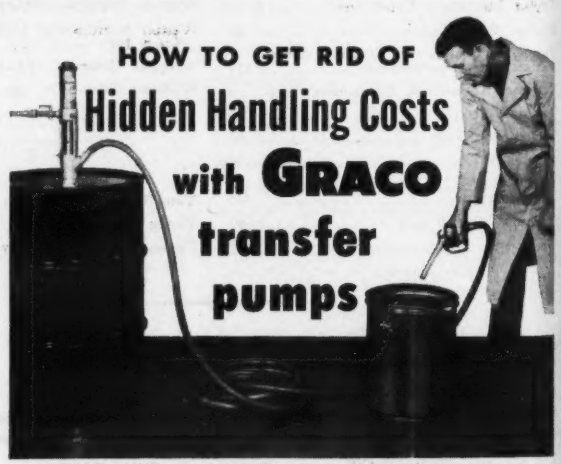
FOR POSITIVE GAUGE PROTECTION, CHOOSE CIRCLE SEAL GAUGE PROTECTORS.

RELIEF VALVES • SHUTOFF VALVES • CHECK VALVES • PLUG VALVES

CIRCLE SEAL precision valves

CIRCLE SEAL PRODUCTS CO., INC.
2181 East Foothill Blvd., Pasadena, Calif.

Check 2733 opposite last page.



GRACO PUMP pays for itself in a hurry. Moves the contents, not the drum. Saves hours of time, gallons of valuable material!

Transfer fluids fast, direct-from-drum and by remote control. Just stick GRACO Fast-Flo transfer pump in drum, attach plant air hose. Pump starts when you open gasoline type valve at end of hose, stops when valve is closed. It's the fastest dispensing and transferring you've ever seen! Changes from drum to drum in a jiffy! Also available in Stainless Steel for safe transfer of "handle-with-care" liquids and semi-fluids. *Say goodby to waste and spillage . . . get the facts on Fast-Flo today!*

FREE IDEA BOOK SHOWS GRACO PUMPS FOR EVERY NEED. SEND FOR IT TODAY!

GRACO
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(See Phone Book Yellow Pages, "SPRAYING," for Graco Suppliers)

Check 2734 opposite last page.

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THAT'S INTERESTING

Private eye for science

Neutrons are being used to induce radioactivity in a variety of materials ranging from drugs to sea water. This new scientific wrinkle enables researchers to track down minute quantities of impurities in substances. The method is called activation analysis.

Egads!

Per capita paper consumption in the U.S. is 417 lb. This amounts to a national total of 73 billion lb a year.

Trivia

A Master of Science in Education degree has been awarded to an Illinois State Normal University student who wrote a thesis entitled "Roadside utilization along selected bypass sites U. S. Route 66 in Illinois."

For more information on product at right, specify 2735 see information request blank opposite last page.

AGAIN

P-K Internal-Fin Coolers can be furnished insulated with Rock Cork laid in asphalt and covered with a heavy steel jacket. Illustration shows insulated cooler.

Revere helps fit the metal to the job

AND PATTERSON-KELLEY CUSTOMERS SAVE 3 WAYS

Because of its unique design, the Patterson-Kelley Freon Water Cooler shown at right above saves space, requires less Freon, while its reduced weight and size mean lower cost.

With the P-K Type FO Internal-Fin Freon 22 Water Cooler the installation can be designed for a shell 2 diameters less and 1 to 2 feet shorter than with conventional plain or bare tube coolers. This is made possible by the use of ¾" O.D. x .035" gauge Revere copper tube drawn over a Revere aluminum extruded fin as shown above. Serrated surface of the fin enhances refrigerant vaporization.

By making both the tube and the extruded fin, and assembling them in the same plant a tight contact between the two metals is assured, thus establishing maximum heat transfer. Once again Revere has helped fit the metal to the job, money was saved and a more efficient product produced.

Why not consult with Revere's Technical Advisory Service and take advantage of its extensive knowledge in "fitting the metal to the job." This Service has saved others money, why not you?

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Founded by Paul Revere in 1801
230 Park Avenue, New York 17, N. Y.

Mills: Rome, N.Y.; Baltimore, Md.; Chicago, Clinton and Joliet, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Brooklyn, N.Y.; Newport, Ark.; Ft. Calhoun, Neb. Sales Offices in Principal Cities. Distributors Everywhere.

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THE FIRST 100% INORGANIC *SELF-CURING* ZINC COATING.

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- Complete protection for as little as 5¢ per square foot material cost.

For complete information write . . .

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The Pioneer Manufacturer of Inorganic Zinc Coatings

910

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MISSOURI	St. Louis
	Kansas City
NEW JERSEY	Kenilworth
NEW YORK	New York
OHIO	Cincinnati
	Cleveland
OKLAHOMA	Tulsa
OREGON	Portland
PENNSYLVANIA	Philadelphia
	Pittsburgh
TENNESSEE	Memphis
	Knoxville
	Nashville
TEXAS	Dallas
	Houston
	Beaumont
UTAH	Salt Lake City
WASHINGTON	Seattle
WISCONSIN	Milwaukee
	Green Bay
HAWAII	Honolulu
PUERTO RICO	Santurce

FOREIGN:

BELGIUM	Brussels
CANADA	Montreal
	Vancouver
CUBA	Havana
DENMARK	Copenhagen
FINLAND	Helsinki
FRANCE	Paris
GREECE	Athens
HOLLAND	Eindhoven
ITALY	Palermo
	Milan
JAPAN	Yokohama
LUXEMBOURG	
SWEDEN	Stockholm
SWITZERLAND	Geneva
	Zurich
UNION OF SOUTH AFRICA	Johannesburg
VENEZUELA	Caracas
	Maracaibo
WEST GERMANY	Hamburg